EAST ZONE
INTERIM EROSION AND FLOOD STUDY

January 1981

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NTA CLARA VALLEY WATER DISTRICT

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SANTA CLARA VALLEY WATER DISTRICT

EAST ZONE

INTERIM EROSION AND FLOOD STUDY

Prepared

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January 1981

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INTRODUCTION

The purpose of this report is to investigate February 1980 erosion and overbanking problems and evaluate their impact on East Zone project priorities. From this evaluation and from consideration of available funding sources a construction schedule for the next two to three years is formulated.

EROSION

Erosion problem areas were identified on three creeks in the East Zone after the February 1980 storms:

Creek	Location	Description	Estimated Cost To Repair
1. Berryessa	D/S of Montague Expwy (Sta. 87-151)	Erosion cutting into west levee and access road on top of levee	$18,000
	U/S Old Piedmont Rd. (Sta. 300+)	Minor erosion of toe of sack concrete channel	$3,000
2. Sierra	U/S Berryessa Crk.	Minor erosion about 80 ft. upstream on both sides	$7,000
3. N. Babb	U/S Lyndale Avenue	Erosion on south side of creek under chain link fence.	$7,000

Proposals for repair of these areas were not accepted for SCS 216 projects. District maintenance forces have repaired the erosion on North Babb Creek (5/15/80). The problem area on Berryessa downstream of Montague Expressway has an erosion hazard classification of IIIA (Active-Severe) and the two remaining areas - Berryessa Creek upstream of Old Piedmont Road and Sierra Creek upstream of Berryessa Creek confluence - are classified IIIB (Active-Moderate). Appendix A describes the erosion classification system. A classification of IIIA indicates that an active erosion problem exists with more than three feet of soil eroded from the bank, but that it does not threaten structures or require immediate attention. Therefore, it has been resolved that nothing should be done about the erosion on Berryessa and Sierra Creeks at this time. A short chain link fence has been constructed around the eroded access road on top of the west levee of Berryessa Creek downstream of Montague Expressway.

There are two areas in the East Zone not identified earlier which currently have a severe erosion problem (IIIA): Los Coches Creek upstream of the confluence with

Berryessa, and Miguelita Creek downstream of Jackson Avenue. These areas were identified as part of the erosion element of the Waterways Planning Study. No areas in the East Zone have been identified as requiring immediate attention.

FLOODING

Overbanking occurred from five creeks in the east zone in the February 1980 storms. The maps included in this section show the approximate limits of the flooded areas. These maps were drawn from aerial and other photos, interviews with residents and information provided by Maintenance personnel. Photos are in the process of being catalogued, and can currently be found in Mike McNeely's 1980 flood photograph binder, and in Maintenance photograph files.

1. Lower Penitencia Creek

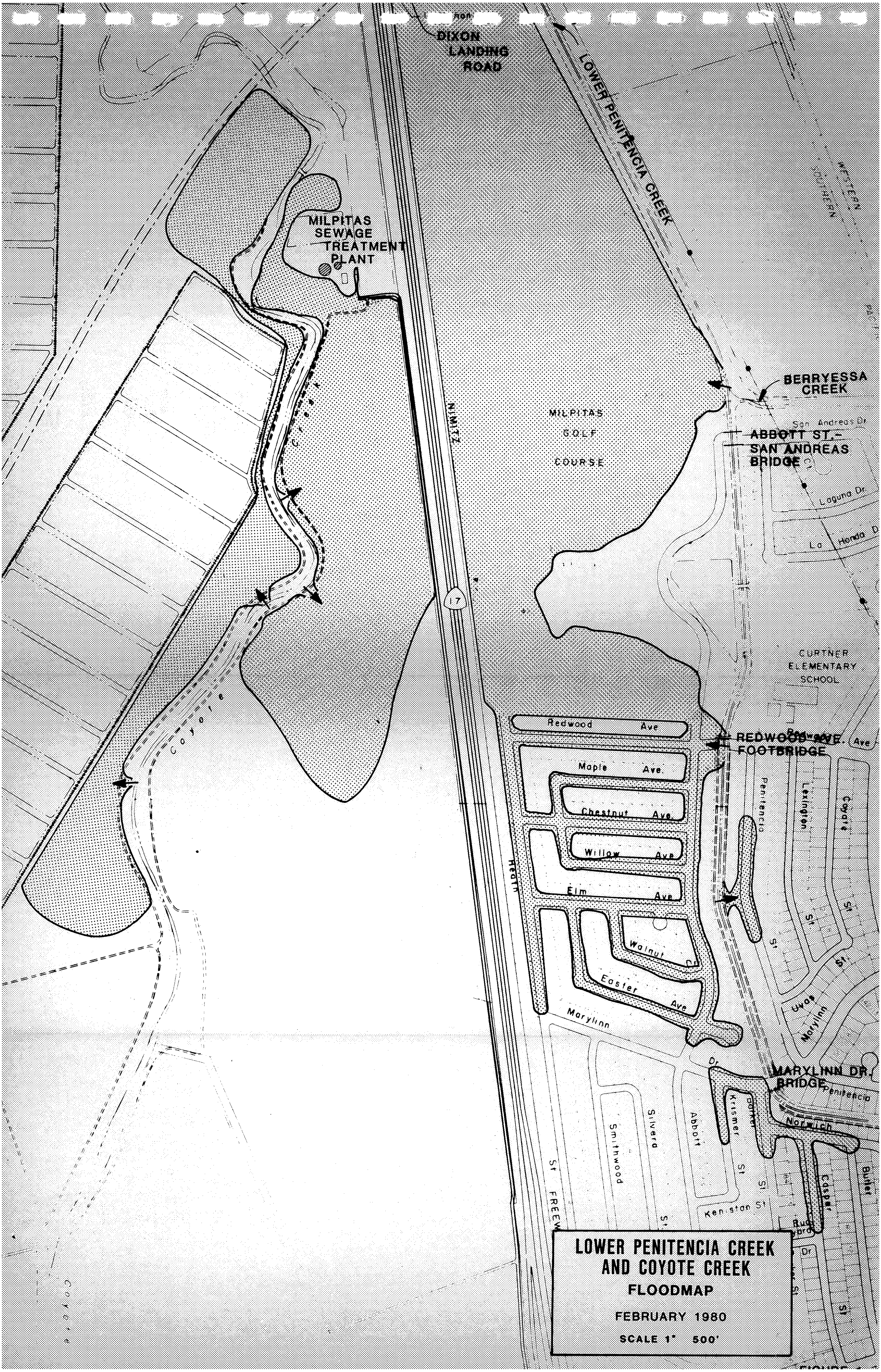
A. Downstream of Abbott Street - San Andreas Street Bridge:

Overbanking of the west levee at the confluence with Berryessa Creek resulted in flooding of Dixon Landing Golf Course (Figure 1). Overbanking began just downstream of the Abbott Street-San Andreas bridge and extended 400 feet downstream; depth was .5 to 1.0 foot. Water ponded in the golf course and was pumped out near Dixon Landing Maintenance yard to Lower Penitencia (photos in Maintenance files). On Abbott Street water came up to the fence line of the apartments which have patios facing the golf course. Some landscaped areas and a volleyball court were flooded.

B. Redwood Avenue Area (Marylinn Drive to San Andreas Street):

Overbanking occurred on the west levee at Redwood Avenue. The backyards of the first two houses upstream and the first house downstream were flooded, and water flowed through sideyards to the street. From interviews with nearby residents and height of sandbags depth of overbanking is estimated at about .25 to .5 foot.

Storm sewers were unable to drain because of high water in the creek so the whole subdivision west of the creek flooded. The flooding upstream of Marylinn Drive, shown on the flood map, was caused by water backing up in the storm sewers, and was not the result of creek overbanking. Water



LOWER PENITENCIA CREEK AND COYOTE CREEK

FLOODMAP

FEBRUARY 1980

SCALE 1" 500'

extended as far west as Heath, and as far south as Marylinn and Spangler School, up to a depth of three feet (to garage doors in driveways on Heath Street at the west end of Redwood Avenue). Some of the water from the golf course may have also drained into Heath Street.

On the east side of the creek, there was overbanking at one spot behind 733, 741 and 749 Penitencia Street. Depth of overbanking is estimated at about .25-.5 foot. Water flooded backyards and at 741 Penitencia Street flowed out sideyards to the street. The family room floor of this house was water damaged; the resident said her property had not previously been affected by flooding in the 18 years she had lived there. (The frequency of flooding based on estimated channel capacity is 14 years.) Storm drains on Penitencia Street were also unable to drain because of high water in the creek.

It has been suggested that the combination of the storm and a high tide caused unusually high water and overbanking in Lower Penitencia. The channel bottom elevation from the confluence with Berryessa Creek to Marylinn Drive rises from about two feet to five feet above mean sea level (1929 NGVD). The tide is estimated to have been below +3.0 feet NGVD when overbanking occurred sometime between 6 and 8 a.m., February 19, 1980 (see Appendix B). Therefore, it is not likely that the tide played a part in the overbanking that occurred in the February 1980 event.

None of the bridges on Lower Penitencia appear to have been obstructed seriously enough to cause overbanking. Maintenance forces cleared the channel of debris on January 31, 1980 and again on February 14, 1980. The Abbott Street - San Andreas triple box culvert did have two feet of flashboards in place at the bottom of the downstream side (from photograph and Dixon Landing maintenance records). These flashboards, which can vary up to 4 feet in height, are installed by the Dixon Landing Golf Course so that water can be pumped from the creek for irrigation. Ordinarily the boards are removed during the winter months (they have been removed for the 80-81 season). The two boards in place last February could not have had a significant effect on either the overbanking that occurred in the Redwood Avenue area, or the overbanking just downstream of the bridge.

Lower Penitencia Creek downstream of Spence Avenue to Redwood Avenue had a bank full capacity of about 1,100 cfs when constructed in 1955. Since 1955 a number of factors have affected capacity, such as subsidence (0.66 foot since 1954 at Calaveras and Main), bank erosion and sediment deposition. Current maintenance practices result in an 'n' value of 0.035 rather than the 0.030 used in original channel design. The capacity is now estimated at 850 cfs which is inadequate to carry the one percent design flowrate of 1,150 cfs. Frequency of flooding is 7.0 percent (14 years).

Areas adjacent to Lower Penitencia creek experienced flooding which could have originated from a number of sources. For example, on Heath Street at the west end of Redwood Avenue, water could have come from three possible sources:

1. Overbanking of the west levee at Redwood Avenue;
2. Storm drains backing up; and
3. Overbanking of the west levee at the confluence with Berryessa Creek which found its way around the golf course to Heath Street.

It has been suggested that water from Coyote Creek mingled with water from Lower Penitencia Creek through the culverts under Hwy. 17. Appendix C contains a map showing the culvert locations and invert elevations. It is very likely that water from Coyote Creek did reach the golf course through the culverts near Dixon Landing Road which have invert elevations of about 7 feet. However it is not likely that Coyote floodwaters reached the golf course culverts near the Redwood Avenue subdivision, where invert elevations are between 9 and 10 feet.

2. Berryessa Creek

A. Upstream of Montague Expressway

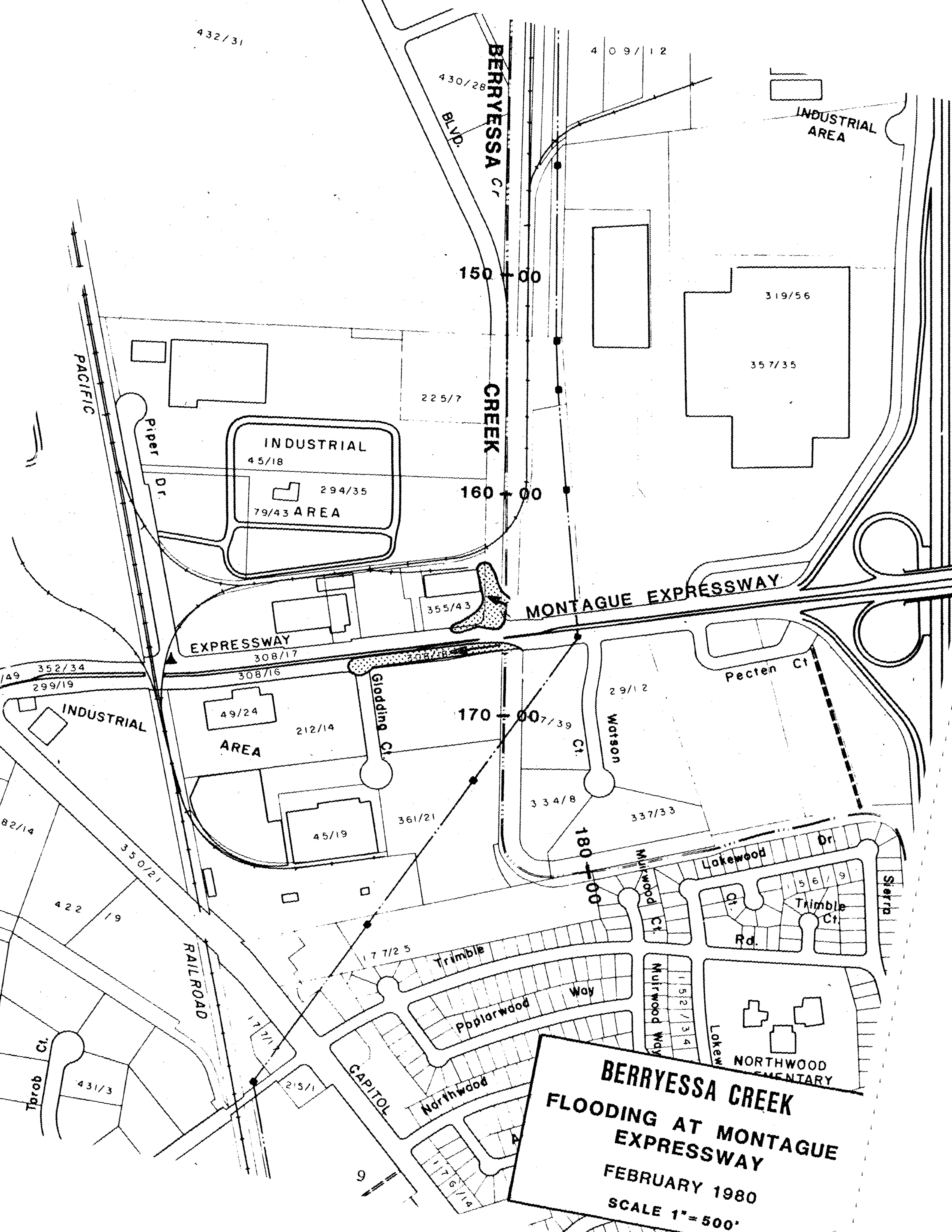
Overtopping occurred on the upstream side of the double box culvert under Montague Expressway (Figure 2). The depth of overtopping was about .25 to .5 foot and water ran down Montague Expressway to storm drains (photos in Maintenance files).

The culvert was silted up about half full before the February storm. The channel bottom flattens out along this section and erosion problems further upstream (e.g. between Cropley and Freeway 680) contributed to the sediment deposition in the culvert. The culvert has been cleaned out by Maintenance forces and the channel between Cropley and Freeway 680 has since been concrete lined.

B. Downstream of Montague Expressway:

Overbanking occurred on the west side just downstream of Montague, about 4 feet in length, to a depth of about .25 feet (from photographs in Maintenance files). The intersection of Montague and South Milpitas Boulevard flooded, including the depressed loading dock of the storage facility on the northwest corner of the intersection. Water was approximately 18 inches deep at the intersection still permitting cars to move through.

The overbanking seems to have been caused by a channel constriction just downstream of the railroad bridge where the bottom width narrows. The bottom slope also steepens to about 0.005 from the relative flatness through the Montague Expressway culvert (see Appendix D for water surface profile).



BERRYESSA CREEK
FLOODING AT MONTAGUE EXPRESSWAY

FEBRUARY 1980

SCALE 1"=500'

The estimated channel capacity of the reach from Yosemite Avenue to Freeway 680 is 800 cfs; frequency of flooding is 32 percent (3 years).

3. Upper Penitencia Creek at Mabury and King Roads

The creek overbanked on the west side at two locations between Mabury and King Roads (Figure 3). One location was about 100 feet downstream of the box culvert at Mabury, the other about 300 feet downstream of the box culvert. Water flowed along the depression on the north side of Mabury Road to the intersection of King and Mabury Roads. Depth at the intersection was about 2-3 feet and the basement of the house at the northwest corner was flooded. According to residents the creek overbanks fairly often but usually stays in the field north of Mabury Road and does not reach the intersection.

The District has no right of way on the west side of the creek between King and Mabury; an easement exists along part of the east side. Lack of access for channel maintenance has resulted in diminishing capacity.

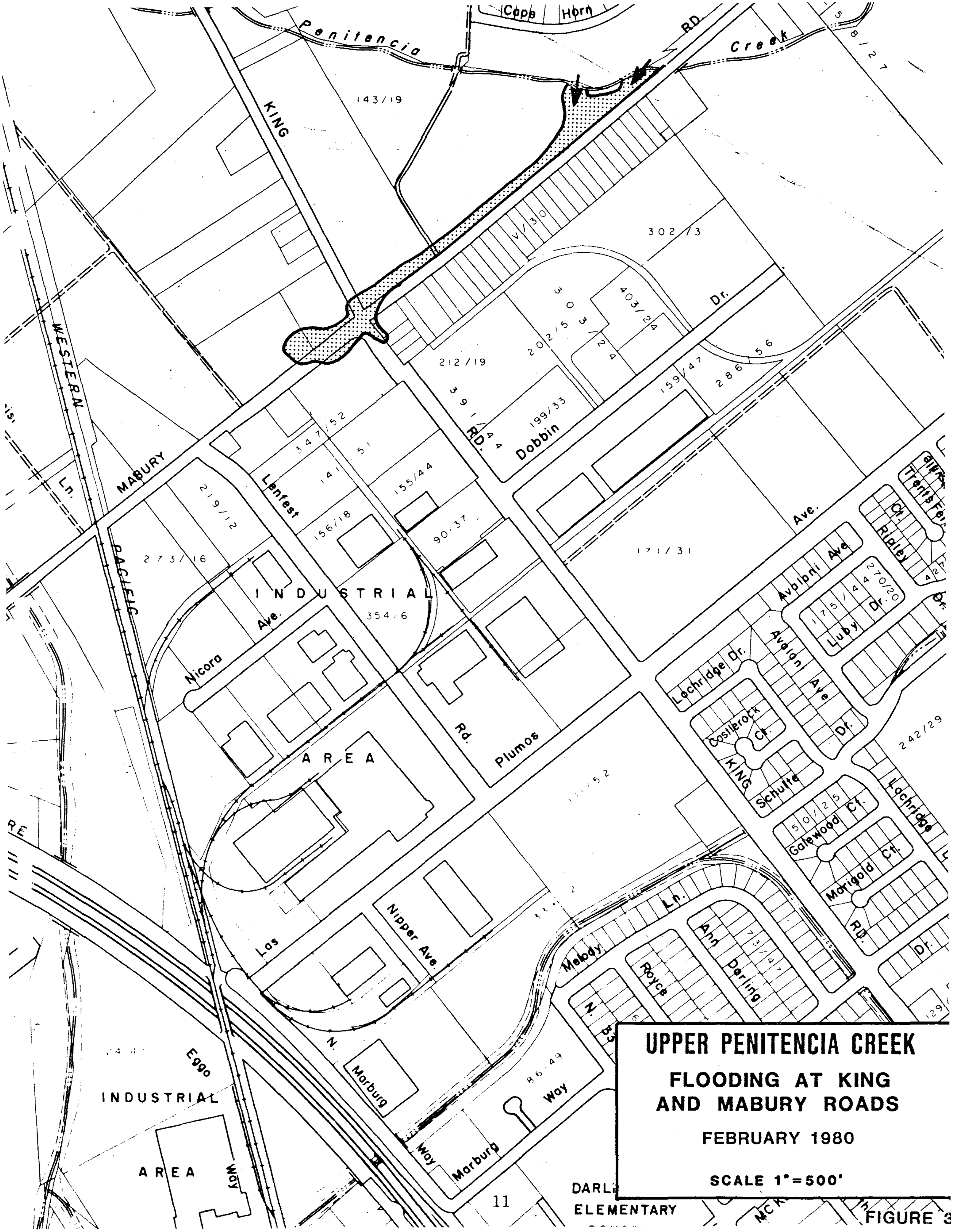
At Streamgage No. 1 near Old Piedmont Road (2.27 miles upstream of overbanking) a peak discharge of 888 cfs was recorded for February 19, 1980. At Streamgage No. 2 near King Road (0.28 mile downstream of overbanking) a peak discharge of 815 cfs was recorded. Streamgages No. 72 and No. 1A show that no flow was diverted into recharge areas.

FIA studies have estimated channel capacity at King Road of 960 cfs.

Based on this information the previous estimates of channel capacity have been revised slightly from 1,000 cfs down to 900 cfs. Frequency of flooding is 25 percent (4 years).

4. Coyote Creek Between Dixon Landing and Milpitas-Alviso Roads

As shown in Figure 1, floodwaters overtopped existing levees at two locations on the west side and at two locations on the east side between Dixon Landing Road and Milpitas-Alviso Road (locations indicated by Maintenance and



UPPER PENITENCIA CREEK

FLOODING AT KING AND MABURY ROADS

FEBRUARY 1980

SCALE 1"=500'

FIGURE 3

shown in aerial photos). Water on the west side-sheet flowed toward Highway 17 and ponded in fields and orchards. No damage or inconvenience was reported.

A levee break occurred about .9 mile upstream of the Milpitas-Alviso Road, northeast of Agnews State Hospital. A farm house and barns were surrounded with water. Sandbags were placed along 40 feet of the west bank.

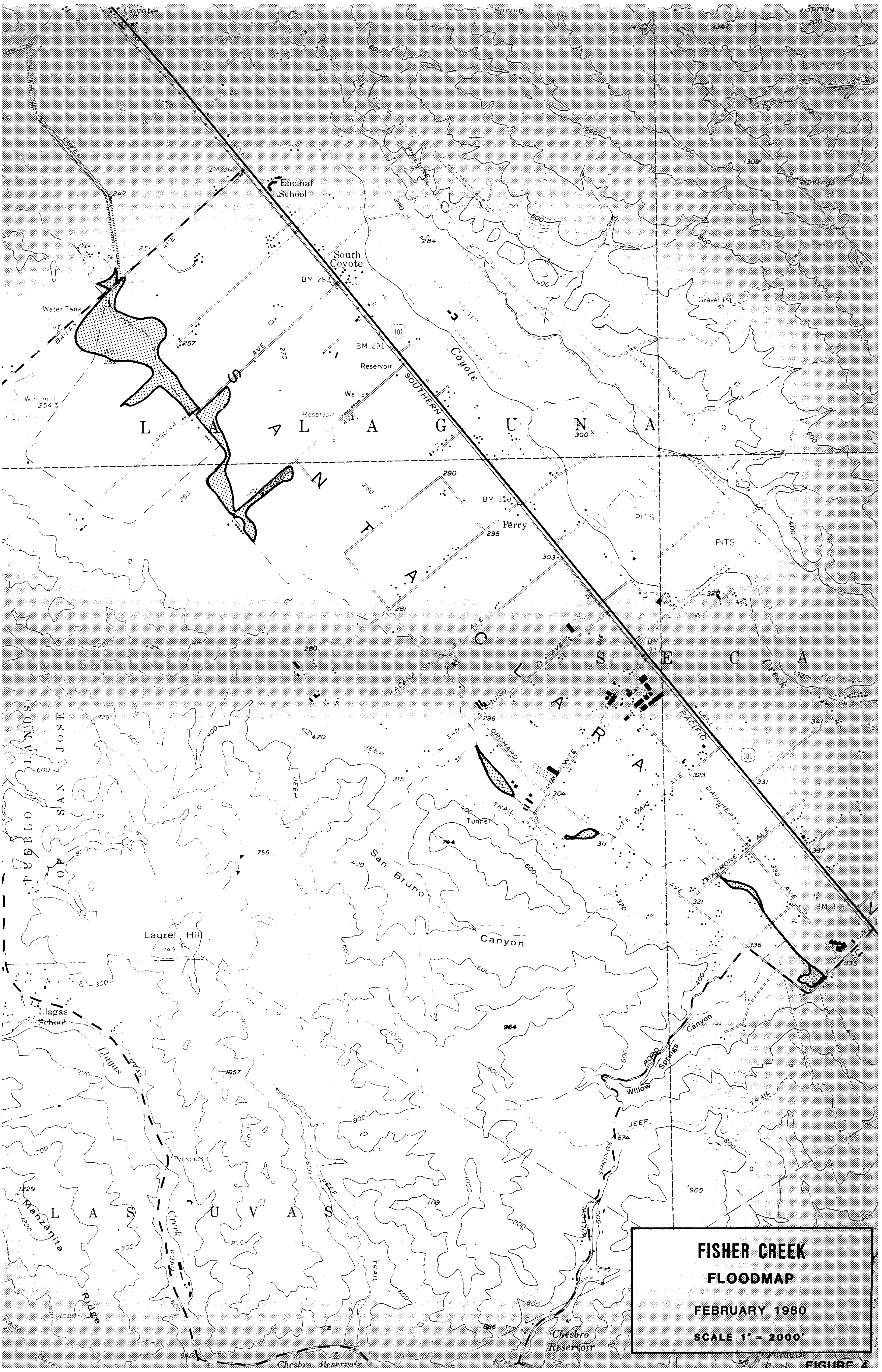
The estimated capacity of this channel is 1,250 cfs, which is inadequate to carry even the 10-year design flowrate of 8,200 cfs. Frequency of flooding is 87 percent. The FIA study shows the only flow remaining in the creek at the Milpitas Sewage Treatment Plant near Dixon Landing Road during a 10-year and/or 100-year event is 1,500 cfs. Most of the flow overbanks upstream.

5. Fisher Creek Between Bailey and Tilton Avenues

Overbanking occurred at a number of spots between Bailey and Tilton Avenues (Figure 4). Flooding affected fields, roads, barns and houses (615, 617 and 617B Hale Avenue and in Caprista Court). A number of aerial slides of this reach were taken 24 hours after the peak of the storm but because the land is relatively flat it is difficult to tell in the slides what water is local drainage and ponding and what water is the result of channel inadequacy.

Streamgage No. 10 at Monterey Road showed a peak discharge of 740 cfs on February 19, 1980. In 1978 there were reports of flooding in the reach between Richmond and Laguna Avenues; the peak discharge that year at Streamgage No. 10 was 550 cfs.

The estimated capacity of the channel, which is an unimproved creek, has been revised slightly from 850 cfs to 700 cfs based on the experience of the 1980 flooding. The FIA Study shows a 100-year discharge of 700 cfs at Richmond Avenue, with 800 cfs overbanking 500 feet downstream of Richmond Avenue. Frequency of flooding is estimated to be 19 percent (5 years).



FISHER CREEK
FLOODMAP

FEBRUARY 1980

SCALE 1" = 2000'

FIGURE 4

DISCUSSION

This investigation did change the District's understanding of the flood problems in the East Zone and resulted in revisions to the priority ranking previously established. The revisions made were:

1. The capacity and one percent flood damages of Lower Penitencia between the confluence with Berryessa Creek and Montague Expressway were reevaluated. Previously this entire reach had been thought adequate, when only the portion between Spence Avenue and Montague Expressway is adequate.
2. The one percent flood damages from Berryessa Creek between Calaveras Boulevard and Morrill Avenue were calculated using the flood limits and depths shown on the FIA maps. The depths were up to three feet which resulted in a much greater estimate of damages.
3. The one percent flood damages of Upper Penitencia Creek upstream of Freeway 680 were revised based on the more extensive floodplain shown on the FIA floodmaps which results in a much greater estimate of damages.
4. Estimates of flood damages from Fisher Creek were checked and reduced from the previous estimate.
5. Minor reductions were made in the capacity estimates of two creeks: Fisher Creek between Bailey and Tilton; and Upper Penitencia between Coyote Creek and Freeway 680.

The possibility of heavy spills from Anderson Reservoir this year and resulting overbanking from Coyote Creek has no effect on the estimates of potential flood damages used to establish priorities. The probabilities of incurring damages remains the same.

PROJECT PRIORITIES AND PROJECT DESCRIPTIONS

The 13-year construction plan adopted in 1974 established project priorities for Lower Silver Creek, Lower Penitencia, and Berryessa Creek. Those portions of the 13-year plan which have been completed are:

Creek	Project
Lower Silver Creek	Sunset Bridge Lake Cunningham Thompson Crk. to King Rd.
Norwood Creek	
Thompson Creek	Quimby to Aborn
Upper Silver Creek	
Berryessa Creek	Lower Penitencia Crk. to Calaveras Blvd.

Giving consideration to the 13-year plan adopted in 1974 and the present priorities established from the most recent flood hazard information and the current ranking criteria; the construction priorities for the East Zone for the near future are:

		June 1980 Project Costs ($1,000)
1.	Lower Silver Creek	
	McKee Rd. - Fwy. 680	2,162
	Coyote Crk. - McKee Rd.	4,471
	Murtha - Cunningham Ave.	1,793
	Fwy. 680 - Murtha Dr.	2,982
	Cunningham - Thompson Crk.	3,251
2.	Lower Penitencia Creek	
	Coyote Crk. - Berryessa Crk.	1,588
	Berryessa Crk. - Spence Ave.	340
3.	Berryessa Creek	
	Calaveras - Montague Expwy.	1,300
	Montague - Morrill	359
4.	Upper Penitencia Creek	
	Coyote Crk. - Capitol Ave.	3,326
	Capitol Ave. - Dorel Drive	5,033

The priority established for each reach in the East Zone is shown in Appendix E.

1. Lower Silver Creek

A Preauthorization Report for a PL 566 project on Lower Silver Creek by the Soil Conservation Service has been completed and a planning start approved. The PL 566 project will address the five reaches listed under Lower Silver Creek. A detailed work plan is expected to be complete in early 1983, and construction is estimated to be completed in 1985. The estimated total installation cost is $14,290,000. The cost to the District would be $1,237,000 as our share of local costs.

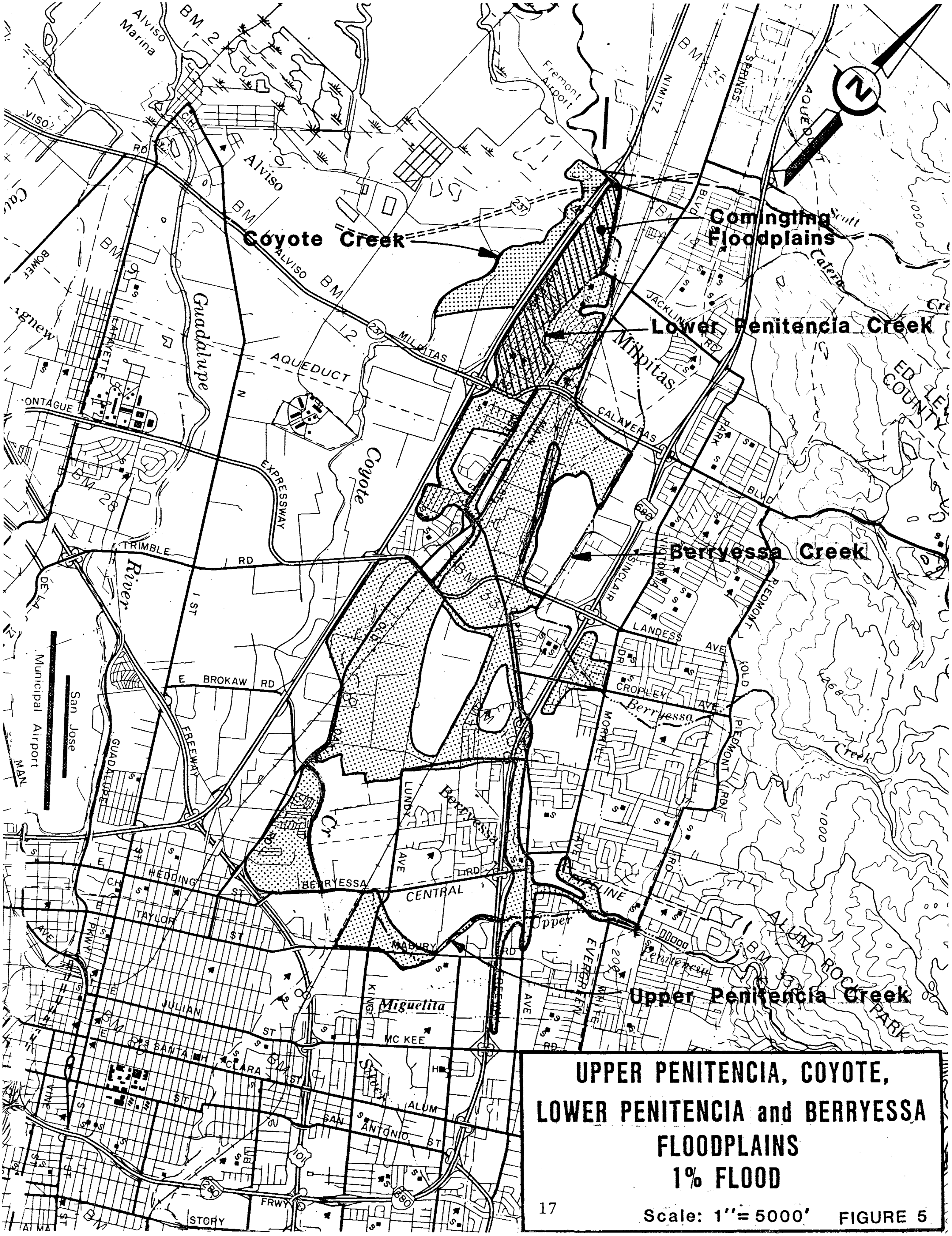
2. Lower Penitencia Creek

Lower Penitencia Creek has itself a potential for significant flood damages but the one percent floodplain comingles with overflow from Berryessa and Upper Penitencia Creeks and with overflow from Coyote Creek through the culverts under Hwy. 17. The area subject to flooding from Lower Penitencia Creek cannot be totally protected without conjunctive works on Berryessa, Upper Penitencia, and Coyote Creeks. Figure 5 illustrates the comingling floodplain.

The total project proposed for Lower Penitencia in 1973 includes the construction of an unlined trapezoidal channel from Coyote Creek to Berryessa Creek. The cost is estimated at $1,588,000, of which $824,000 is for additional right of way. The adjacent land is used for agriculture and the abandoned Dixon Landing Golf Course.

The golf course is being proposed for development in which case the right of way will be dedicated and possibly some channel improvements constructed. It would be more likely to expect that the developer will construct improvements on Lower Penitencia if this would solve his flooding problems. However, the golf course is part of the 100-year floodplain of Upper Penitencia and Coyote Creeks as well and unless conjunctive work can be coordinated on these creeks it is unlikely that the developer of the golf course will construct improvements on Lower Penitencia Creek.

Between Berryessa Creek and Redwood Avenue the proposed improvements include raising the levees three feet and between Redwood and Spence Avenues three-



UPPER PENITENCIA, COYOTE,
LOWER PENITENCIA and BERRYESSA
FLOODPLAINS
1% FLOOD

Scale: 1″ = 5000′

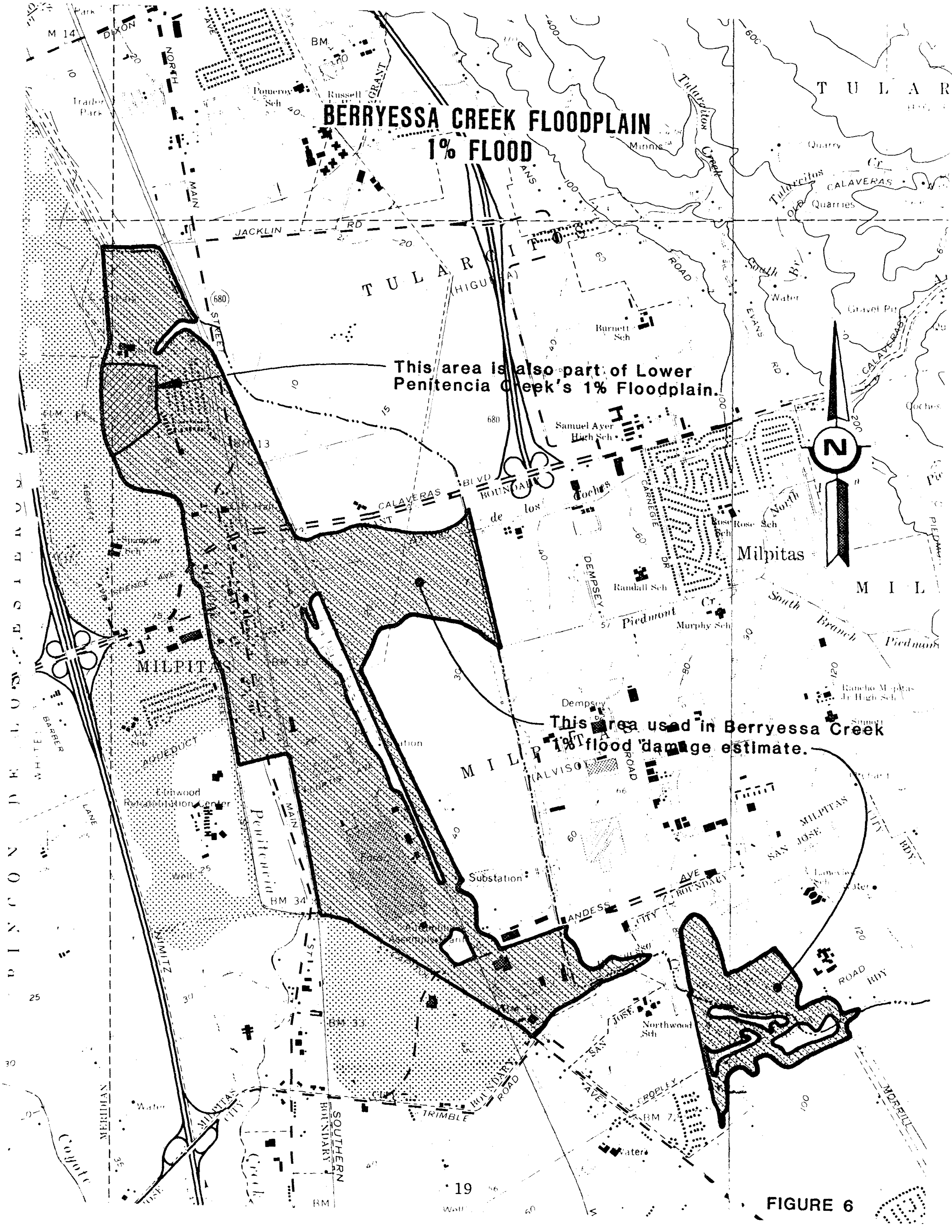
FIGURE 5

foot floodwalls will be constructed on both sides of the creek. This work has a total cost of $340,000, of which $25,000 is for additional right of way. Completion of this work would reduce the frequency of events such as the overbanking which occurred in the Redwood Avenue area during February 1980 but will not provide complete 1% protection to the area. The improvements can be done without causing significant induced damages downstream and will contribute toward the total solution of Lower Penitencia's floodplain. The existing channel is an improvement made in the 1950's and early 1960's, therefore, any new work will not require a formal engineer's report. This will expedite the planning process.

3. Berryessa Creek

Berryessa Creek has the potential to cause one percent flood damages estimated to be at least $23,900,000 and together with a potential for very frequent flooding this produces high average annual damages, over $400,000. A large portion of these damages is to the residential area east of Lower Penitencia Creek and south of Berryessa Creek, where depth of floodwater is about three feet. The Berryessa Creek floodplain is shown in Figure 6. The details of the one percent flood damages are shown in Appendix F. The portion of Berryessa Creek's 1% floodplain used for flood damage estimates and the area which would be completely protected by providing channel improvements on Berryessa Creek is delineated on the map in Figure 6. Most of the flooded area is unaffected by floodwater from either Upper or Lower Penitencia Creeks. The exception is a small portion of the residential area adjacent to Lower Penitencia (shown crosshatched on the map) which is subject to flooding from Lower Penitencia Creek as well.

The FIA maps for Milpitas have been finalized and the annual cost of flood insurance for structures and contents in the Milpitas part of Berryessa Creek's floodplain is about $195,000. When the FIA maps for San Jose are finalized it is estimated the annual insurance costs will increase by $169,000, for a total annual cost of $364,000.



BERRYESSA CREEK FLOODPLAIN
1% FLOOD

This area is also part of Lower Penitencia Creek's 1% Floodplain.

This area used in Berryessa Creek 1% flood damage estimate.

FIGURE 6

In 1973 the District proposed to construct an excavated earth channel on Berryessa Creek between Calaveras Boulevard and Morrill Avenue. That project has an estimated cost of $1,659,000, of which about $230,000 is for additional right of way. Section 205 of the 1948 Flood Control Act authorizes the Corps to design and construct small flood control projects. The Federal cost limit for these projects is normally $2,000,000, or $3,000,000 if the project is located in an area that has been declared a disaster area within a period five years prior to authorization. About two years are usually required for the authorization process and another two years for completion of construction. Berryessa Creek is considered a suitable candidate because costs are less than $2 million, because a very favorable B/C exists (approximately 3 to 1), and because the project would provide a "complete and separable" solution to the flood problem in most of Berryessa Creek's floodplain. The local share of costs would be for right of way ($230,000), utilities, any costs over the Corps limit, and project coordination. It may be possible to include a floodwall and raising of the east levee along Lower Penitencia Creek in the Berryessa Section 205 project so that complete flood protection can be provided to the residential area adjacent to Lower Penitencia (additional cost of about $157,000).

4. Upper Penitencia Creek

The 100-year floodplain for Upper Penitencia Creek extends as far north as Dixon Landing Road and comingles with the floodplains of Berryessa Creek, Coyote Creek and Lower Penitencia Creek, as shown in Figure 5. The inadequate portions of Upper Penitencia Creek which affect Lower Penitencia's and Berryessa's 100-year floodplains are: 1) the Capitol Avenue bridge, and the channel between Capitol Avenue and Freeway 680; 2) the culvert at Penitencia Creek Road and channel just upstream to Piedmont Road. Appendix G contains a brief description of improvements proposed in 1973 and estimated costs. A planning study has never been approved for flood protection measures on Upper Penitencia Creek, although there were plans prepared in 1973.

CASH FLOW ANALYSES

A number of cash flow analyses were made using different financing scenarios to determine a timetable for recommended projects. The scenarios considered were:

1. Existing financial conditions, without AB549 assessments
2. With AB549 assessments of $12 per house annually countywide
3. With AB549 assessments of $12 per house annually and a Corps 205 project on Berryessa Creek.

Other AB549 assessment levels have been suggested and adjustment may be made after the first year if the assessment issue passes, so there are other possible cash flow schedules than those resulting from the three scenarios evaluated. An AB549 assessment level of $12 per house is the one which currently seems most likely to be approved. The East Zone's portion of this assessment would be $2.08 million.

Without AB549, the construction cash flow schedule would look as follows:

	1981-82	1982-83	1983-84	1984-85
Lower Silver Creek (local share)	0	545	627	721

With current anticipated taxes, interest and fees, no construction program could be supported in the East Zone. Income from the East Zone would barely be sufficient to cover administration and maintenance expenses and the required local share of the PL566 project on Lower Silver Creek.

Alternate sources of money might make some projects possible; for example, the Cities of Milpitas and San Jose might contribute the $230,000 needed for right of way purchase to accomplish a Corps 205 project on Berryessa Creek.

A more optimistic picture would be with an AB549 assessment of $2.08 million for the East Zone increased annually at 10 percent:

	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
Lower Silver Creek (local share)		545	627	721		
Lower Penitencia Creek						
Coyote-Berryessa	878	948				
Berryessa-Spence Ave.	391					
Berryessa Creek						
Calaveras-Montague	283	1309				
Montague-Morrill			546			
Upper Penitencia Creek			799	2,796	2204	3552

If, in addition to an AB549 assessment of $2.08 million, a Corps of Engineer's Small Flood Control Project was done on Berryessa, the cash flow schedule would look as follows:

	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
Lower Silver Creek (local share)		545	627	721		
Lower Penitencia Creek						
Coyote - Berryessa	878	948				
Berryessa-Spence Ave.	391					
Berryessa Creek (local share)			365			
Upper Penitencia Creek			2397	2874	3090	3338

Income from AB549 assessments for at least one year would supply the local share of projects on Lower Silver Creek and Beryessa Creek, and cover the cost of improvements on Lower Penitencia Creek from Berryessa to Spence Avenue. If the AB549 assessments continue for the next ten years, improvements on both Lower and Upper Penitencia Creeks can be completed by 1989-90. A Corps project on Berryessa Creek would allow completion of Upper Penitencia Creek a year sooner (1988-89 instead of 1989-90). If the AB549 assessments do not continue or are significantly reduced, construction funds may still be found from other sources.

The 1980-81 budget includes 660 hours in Special Project Division to investigate the problems and begin preparation of plans and specifications. Funds for construction were not budgeted since costs were not known at budget time. About $350,000 was expected to be needed for erosion repairs, but it has been resolved that no erosion repairs should be conducted at this time.

RECOMMENDED ACTIONS

1. No additional erosion repair work should be undertaken at this time.
2. Begin immediately actions necessary to submit an application to the Corps of Engineers for a Small Flood Control Project on Berryessa Creek.
3. Prepare an informal engineer's report on proposed improvements for Lower Penitencia Creek. The 1980-81 budget includes 660 hours in Special Projects Division for preparation of plans and specifications as soon as an engineer's report is completed. Installation of proposed improvements between Berryessa Creek confluence and Spence Avenue would provide some protection from more frequent flooding to the adjacent subdivisions, would not cause induced flooding downstream, and would cost about $400,000. Construction of these improvements will be possible if AB549 assessments are imposed for at least one year.
4. Finalize planning study for Upper Penitencia Creek. The budgets for 1981-82 and 1982-83 should include $60,000 for completion of a planning study. Construction of improvements on Upper Penitencia Creek are contingent on the continuance of AB549 assessments for the next ten years, or the availability of construction funds from some other source.

APPENDIX A

EROSION HAZARD CLASSIFICATION SYSTEM

* * *

DEFINITIONS FOR CLASSIFYING EROSION PROBLEMS

1.0	STABLE	- THERE IS NO PHYSICAL EVIDENCE OF EROSION PROBLEMS AND TRACTIVE FORCE ANALYSIS INDICATES PERMISSIBLE VELOCITIES ARE GREATER THAN ACTUAL VELOCITIES
2.0	POTENTIAL	- BANK APPEARS STABLE BUT TRACTIVE FORCE ANALYSIS INDICATES POTENTIALLY EROSIVE VELOCITIES
3.1	ACTIVE (NEGLIGIBLE)	- LESS THAN 3 INCHES OF SOIL HAS ERODED FROM BANK CHANNEL PRACTICALLY IN AS-BUILT CONDITION
3.2	ACTIVE (SLIGHT)	- BETWEEN 3 AND 12 INCHES OF SOIL HAS ERODED FROM BANK
3.3	ACTIVE (MODERATE)	- BETWEEN 1 AND 3 FEET OF SOIL HAS ERODED FROM BANK
3.4	ACTIVE (SEVERE)	- MORE THAN 3 FEET OF SOIL HAS ERODED FROM BANK
4.0	URGENT	- BANK IS ACTIVELY ERODING AWAY AND POSES AN IMMEDIATE THREAT TO STRUCTURE; OR THREATENS CONSEQUENCES SUCH AS TOTAL LEVEE FAILURE OR DROP STRUCTURE FAILURE; OR THREATENS THE DISRUPTION OF PUBLIC ROADWAY OR OPERATIONS OF PUBLIC UTILITIES

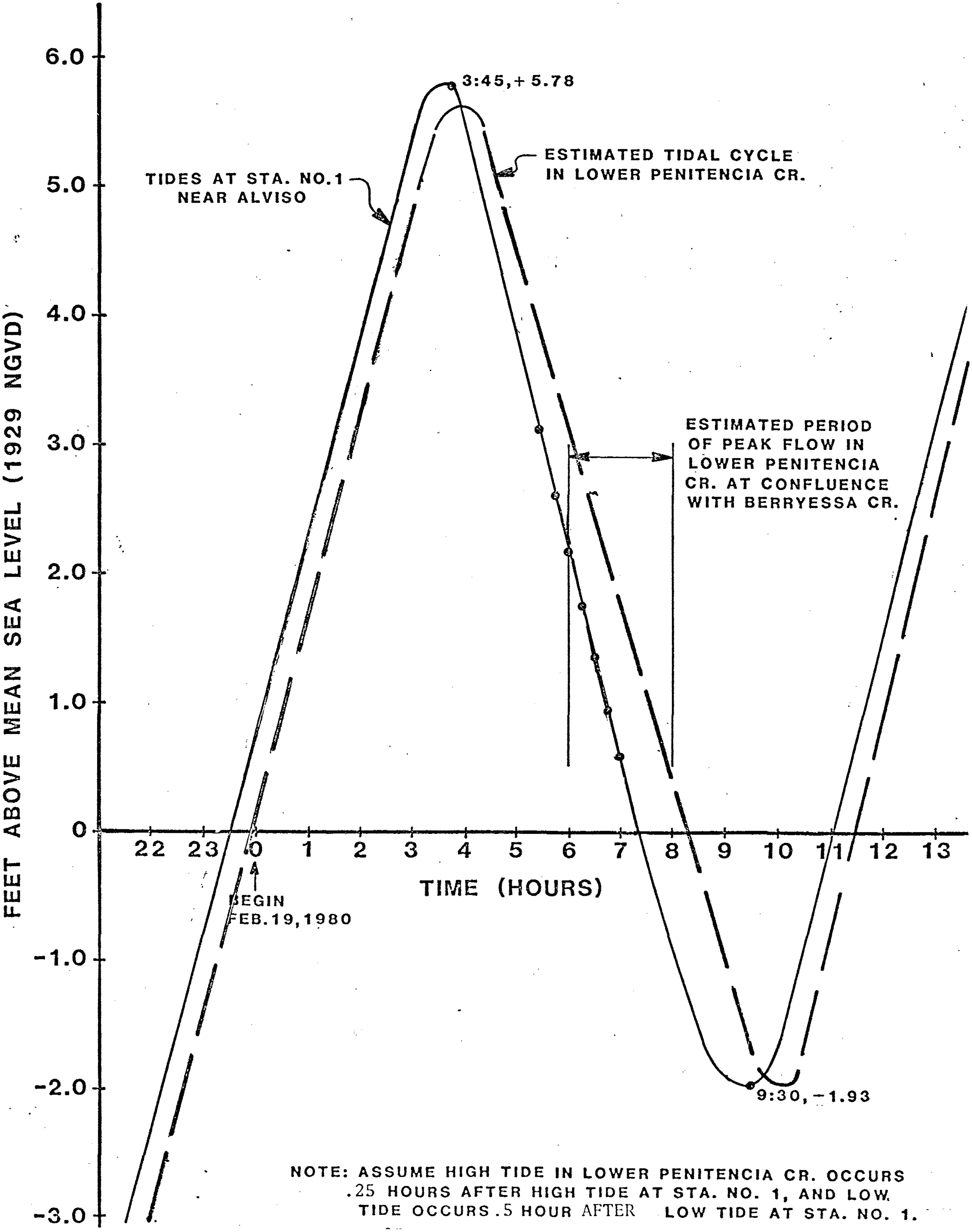
* * *

APPENDIX B

ESTIMATED TIDE IN LOWER PENITENCIA CREEK

FEBRUARY 19, 1980

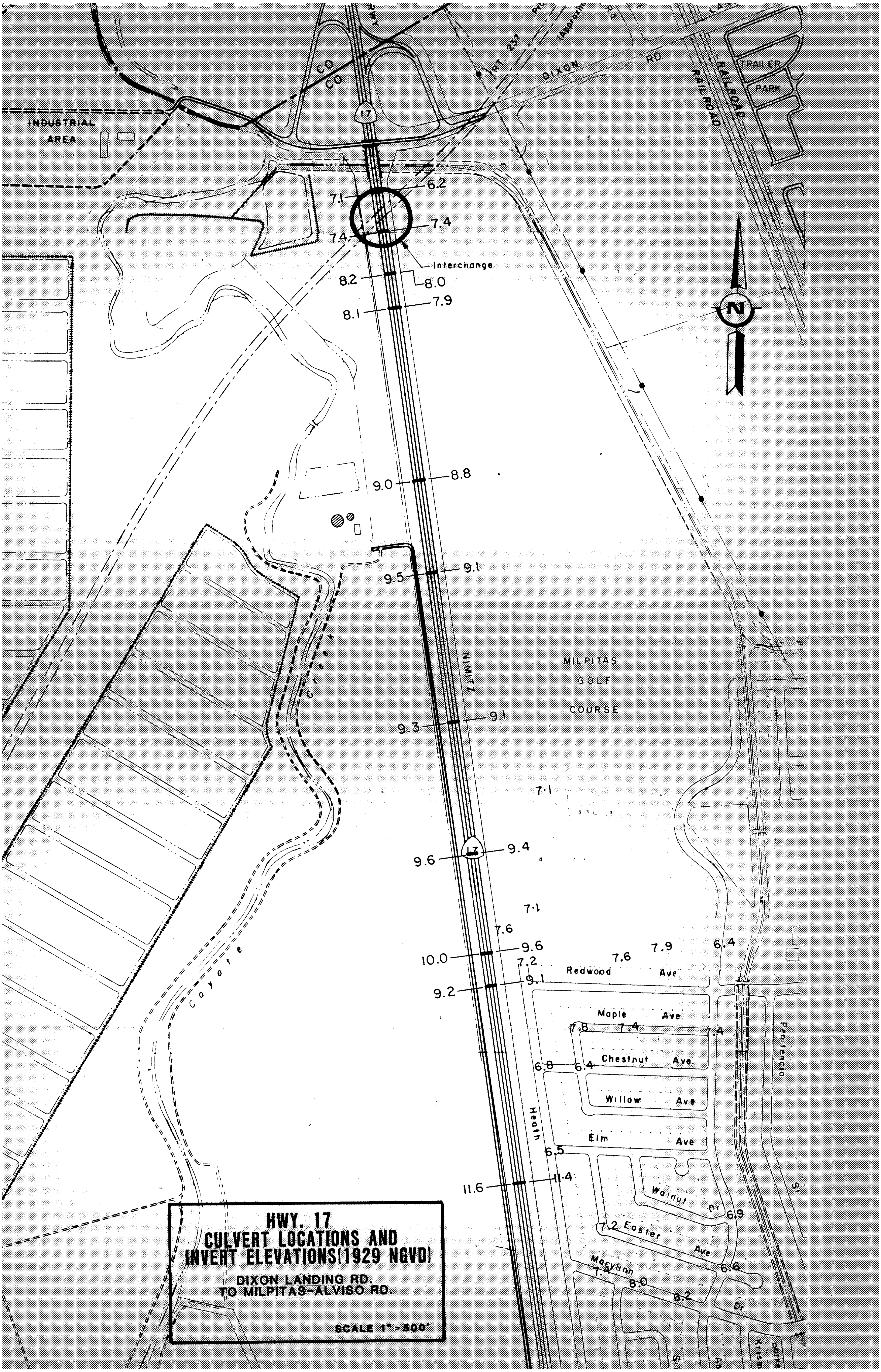
ESTIMATED TIDE IN LOWER PENITENCIA CREEK
FEBRUARY 19, 1980



NOTE: ASSUME HIGH TIDE IN LOWER PENITENCIA CR. OCCURS .25 HOURS AFTER HIGH TIDE AT STA. NO. 1, AND LOW TIDE OCCURS .5 HOUR AFTER LOW TIDE AT STA. NO. 1.

APPENDIX C

HIGHWAY 17 CULVERT LOCATIONS AND INVERT ELEVATIONS



HWY. 17
CULVERT LOCATIONS AND INVERT ELEVATIONS (1929 NGVD)

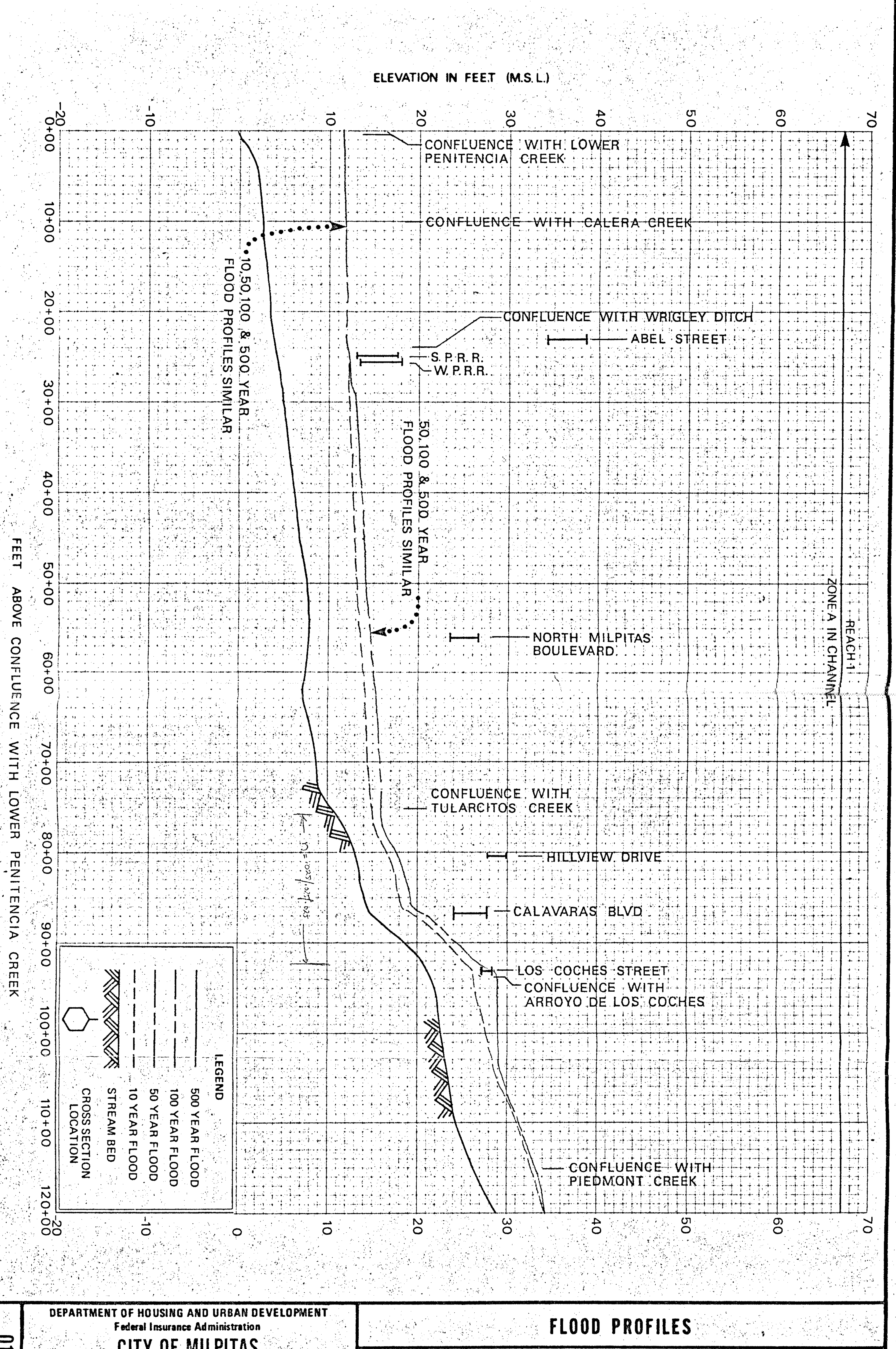
DIXON LANDING RD.
TO MILPITAS-ALVISO RD.

SCALE 1" = 500'

APPENDIX D

FLOOD PROFILES

BERRYESSA CREEK

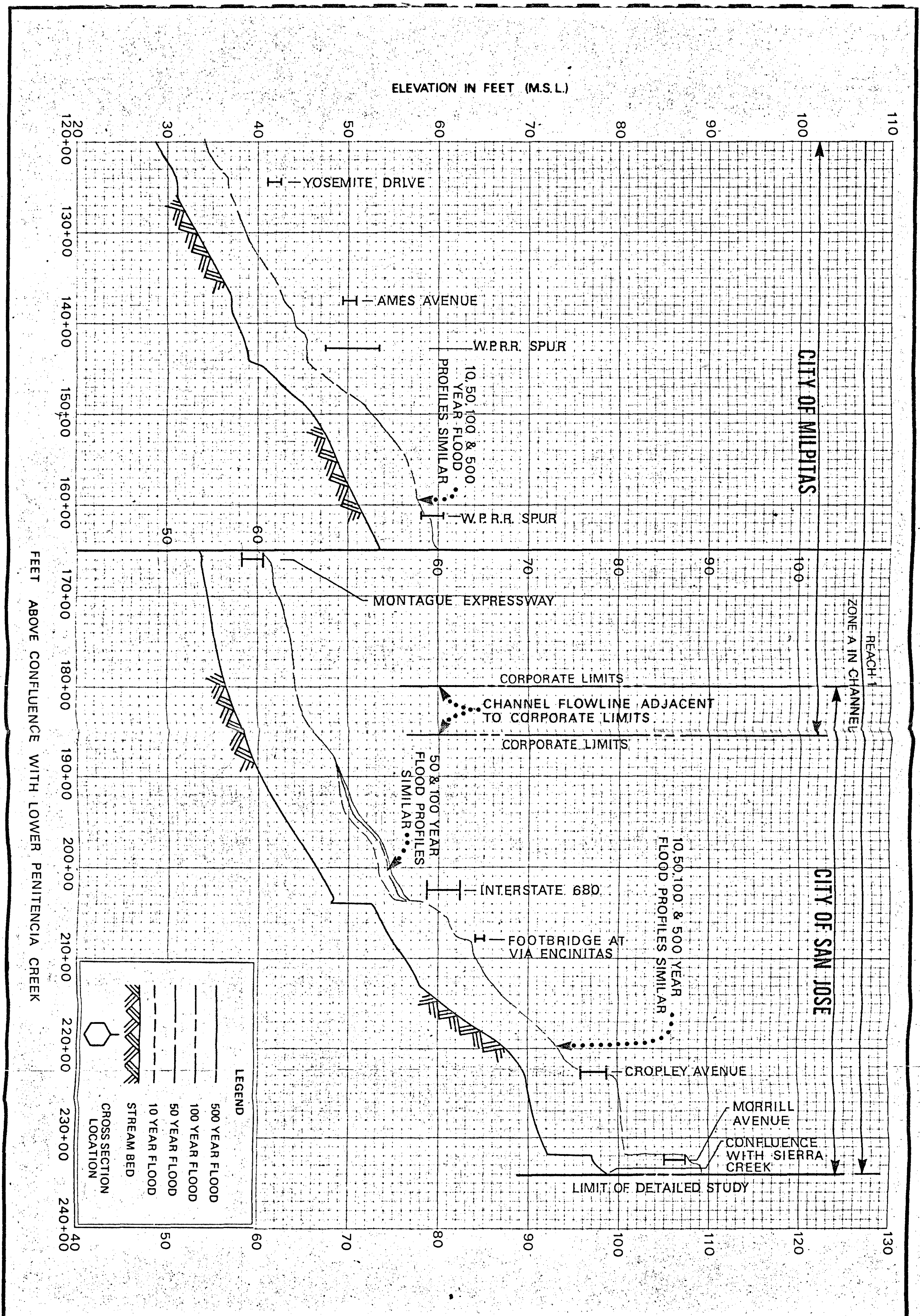


DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CITY OF MILPITAS
(SANTA CLARA COUNTY)

FLOOD PROFILES

BERRYESSA CREEK

01P



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration
CITIES OF MILPITAS & SAN JOSE
(SANTA CLARA COUNTY)

FLOOD PROFILES

BERRYESSA CREEK

APPENDIX E

FLOOD CONTROL PRIORITY RANKING

AND

CASH FLOW SCHEDULES

EAST ZONE

FLOOD CONTROL PRIORITY RANKING

PRIORITY ITEM NUMBER	#1	#2
WEIGHTING FACTORS	50	12.6

RANK	CREEK REACH	FREQ OF FLOOD YEAR	1% FLOOD DAMAGES 1000$	AVG ANNUAL 1000$	DEVLPD AREA ACRES
1	LOWER SILVER CREEK FWY 680-MURTHA DR	3.	5110.	315.8	365.
2	LOWER PENITENCIA CREEK BERRY.CRK-SPENCE AVE	14.	9554.	233.5	272.
3	BERRYESSA CREEK CALAVERAS-YOSEMITE AVE	3.	4238.	216.4	142.
4	LOWER SILVER CREEK MCKEE RD-FWY 680	3.	3447.	189.6	514.
5	LOWER SILVER CREEK COYOTE CREEK-MCKEE RD	6.	4044.	166.7	222.
6	UPPER PENITENCIA CREEK FWY 680-DOREL DR	5.	3002.	126.0	424.
7	LOWER SILVER CREEK MURTHA-CUNNINGHAM AVE	3.	1158.	61.9	211.
8	UPPER PENITENCIA CREEK COYOTE CRK-FWY 680	4.	1058.	50.0	139.
9	LOWER SILVER CREEK CUNNINGHAM-THOMPSON CRK	8.	900.	31.2	160.
10	COYOTE CREEK INR.LEVEE-MONTAGUE EXPWY	1.	269.	24.1	189.
11	RUBY CREEK SILVER CRK-HDWTS	2.	502.	39.1	63.
12	BERRYESSA CREEK YOSEMITE AVE- FWY 680	3.	560.	31.9	79.
13	FISHER CREEK BAILEY AVE-TILTON AVE	5.	601.	25.6	262.
14	QUIMBY CREEK THOMPSON CRK-HDWTS	3.	500.	31.7	78.
15	COYOTE CREEK MONTAGUE EXPWY-BAYSHORE	31.	1385.	25.2	191.
16	COYOTE CREEK BAYSHORE-FWY 280	26.	1147.	22.1	351.
17	BERRYESSA CREEK FWY 680- SIERRA CREEK	24.	480.	9.4	48.
18	LOWER PENITENCIA CREEK COYOTE CRK-BERRYESSA CRK	8.	128.	4.4	92.
19	SOUTH BABB CREEK SILVER CRK-HDWTS	4.	143.	6.5	33.
20	COYOTE CREEK METCALF-ANDERSON DAM	13.	62.	1.5	40.
21	LOS COCHES CREEK BERRYESSA CRK-HDWTS	76.	175.	2.0	44.

```
                                   TEN YEAR PLANNING SCHEDULE                                                  12/22/80
                                           EAST ZONE

 PLANNING - 10 PROJECTS/YEAR      DESIGN - 10 PROJECTS/YEAR        INFLATION RATE = .1500 /YEAR      INVESTMENT RATE = .1000/YEAR
                              PROJECT  PRVOUS                           SCHEDULE  YEAR                                          TOTAL
      COST FUNCTION           PRIORTY  SPENT                   (ALL COSTS ARE IN 1000S OF DOLLARS)                              PROJCT
     (PROJECT-REACH)          NUMBER   MONIES    80-81   81-82   82-83   83-84   84-85   85-86   86-87   87-88   88-89   89-90   COST

INCOME   INCOME   INCOME


 AB549 FUNDS                                        0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

LOCAL TAX REVENUES                               1062.   1240.   1364.   1500.   1650.   1815.   1997.   2197.   2416.   2658.

OTHER MISC REVENUES-MINOR                           0.      0.      0.      0.      0.      0.      0.      0.      0.      0.


 TOTAL STATE-LOCAL-MISC.REVENUES                 1062.   1240.   1364.   1500.   1650.   1815.   1997.   2197.   2416.   2658.

 PRIOR RESERVES PLUS INTEREST                     176.    682.    871.    952.   1042.   1139.   1246.   1364.   1493.   1635.

 SOME FUNDS CARRIED OVER
 FROM PRIOR YEARS                                 853.      0.     76.     78.     80.     81.     82.     82.     81.     78.


EXPENSES-EXPENSES-EXPENSES


ADMINISTRATION COSTS
                               0         0.       210.    240.    264.    290.    319.    351.    387.    425.    467.    514.    3467.

NORMAL MAINTENANCE
                               0         0.       332.    800.    880.    968.   1065.   1171.   1288.   1417.   1559.   1715.   11195.

MAJOR FACILITY APPROPRIATION
                               0         0.       520.    687.    756.    831.    914.   1005.   1106.   1217.   1338.   1539.    9913.

CONTINGENCY APPROPRIATION
                               0         0.       100.    105.    110.    116.    122.    128.    134.    141.    148.    155.    1258.

ORDINANCE CONSTRUCTION
                               0         0.        43.      0.      0.      0.      0.      0.      0.      0.      0.      0.      43.

BERRYESSA CREEK
  CROPLEY-FWY680               0         0.       301.      0.      0.      0.      0.      0.      0.      0.      0.      0.     301.

LOWER SILVER CR-SUNSET BRIDGE
  CO-OP WITH CITY OF SJ        0         0.       163.      0.      0.      0.      0.      0.      0.      0.      0.      0.     163.
```

			SCHEDULE YEAR										
			80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	
THOMPSON CR NORWOOD CR-ABORN	0	0.	39.	0.	0.	0.	0.	0.	0.	0.	0.	0.	39.
THOMPSON CR QUIMBY-TULLY	0	0.	69.	0.	0.	0.	0.	0.	0.	0.	0.	0.	69.
ENGRG SERVICES - CONST	0	0.	51.	0.	0.	0.	0.	0.	0.	0.	0.	0.	51.
PROJECTS IN PLANNING													
SF BAY STUDY	0	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
WATERWAYS PLAN STUDY	0	0.	14.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14.
WPS-PHASE II EAST ZONE	0	0.	96.	0.	0.	0.	0.	0.	0.	0.	0.	0.	96.
COYOTE CR INTERIM/REMEDIAL STUDY	0	0.	34.	0.	0.	0.	0.	0.	0.	0.	0.	0.	34.
LOWER SILVER-SCS	0	0.	8.	0.	0.	0.	0.	0.	0.	0.	0.	0.	8.
ENGRG SERVICES - PLANNING	0	0.	9.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.
FUTURE PLANNING	0	0.	0.	0.	230.	253.	278.	306.	336.	370.	407.	447.	2628.
NEW PROJECTS--O&C													
FUNDS WHICH ARE SET ASIDE FOR SPECIFIC FUTURE PROJECTS			0.	69.	71.	73.	74.	75.	74.	73.	71.	0.	
BALANCE			100.	21.	0.	0.	0.	0.	0.	0.	0.	0.	

PROJECTS WHICH REMAIN TO BE CONSTRUCTED AFTER 1989-90

CREEK	REACH/STAGE	COST(1000$)	
		80-81	90-91
LOWER SILVER CREEK	LOCAL SHARE OF SCS PROJ	1237.	5003.
LOWER PENITENCIA	COYOTE-BERRYESSA	1480.	5988.
LOWER PENITENCIA	BERRYESSA-SPENCE AVE	340.	1375.
BERRYESSA CREEK	CALAVERAS-MONTAGUE	1236.	5001.
BERRYESSA CREEK	MONTAGUE-MORRILL	359.	1451.
UPPER PENITENCIA CREEK	COYOTE CR-CAPITOL AVE STAGE 1	1073.	4342.
UPPER PENITENCIA CREEK	COYOTE CR-CAPITOL AVE STAGE 2	1073.	4342.
UPPER PENITENCIA CREEK	COYOTE CR-CAPITOL AVE STAGE 3	1073.	4342.
UPPER PENITENCIA	CAPITOL AVE-DOREL DR STAGE 1	1490.	6027.
UPPER PENITENCIA	CAPITOL AVE-DOREL DR STAGE 2	1490.	6027.
UPPER PENITENCIA	CAPITOL AVE-DOREL DR STAGE 3	1843.	7457.
COYOTE CREEK STAGE 1	INBOARD-MONTAGUE	3540.	14321.
COYOTE CREEK STAGE 2	INBOARD-MONTAGUE	2423.	9801.
COYOTE CREEK STAGE 3	INBOARD-MONTAGUE	2451.	9917.
COYOTE CREEK STAGE 4	INBOARD-MONTAGUE	2303.	9315.
COYOTE CREEK	MONTAGUE-BAYSHORE FWY	4706.	19038.
COYOTE CREEK	BAYSHORE FWY-FWY 680	3625.	14665.
COYOTE CREEK	FWY 280-HWY 101	2339.	9462.
COYOTE CREEK	HWY 101-METCALF RD	1851.	7490.
QUIMBY CREEK	THOMPSON - HEADWATERS STAGE 1	1916.	7750.
QUIMBY CREEK	THOMPSON - HEADWATERS STAGE 2	793.	3209.
FOWLER CREEK	THOMPSON - HEADWATERS STAGE 1	1396.	5649.
FOWLER CREEK	THOMPSON - HEADWATERS STAGE 2	723.	2924.
FOWLER CREEK	THOMPSON - HEADWATERS STAGE 3	571.	2310.
RUBY CREEK	SILVER CR -RUBY AVE STAGE 1	801.	3240.
RUBY CREEK	SILVER CR -RUBY AVE STAGE 2	803.	3248.
FISHER CREEK	COYOTE CR- BAILEY STAGE 1	1214.	4911.
FISHER CREEK	COYOTE CR- BAILEY STAGE 2	1214.	4911.
FISHER CREEK	COYOTE CR- BAILEY STAGE 3	1214.	4911.
FISHER CREEK	COYOTE CR- BAILEY STAGE 4	1216.	4920.
FISHER CREEK	BAILEY-TILTON AVE STAGE 1	1671.	6759.
FISHER CREEK	BAILEY-TILTON AVE STAGE 2	1671.	6759.
FISHER CREEK	BAILEY-TILTON AVE STAGE 3	1671.	6759.
FISHER CREEK	BAILEY-TILTON AVE STAGE 4	1671.	6759.
FISHER CREEK	BAILEY-TILTON AVE STAGE 5	1677.	6786.
EVERGREEN CREEK	THOMPSON -HEADWATERS	1235.	4996.
SOUTH BABB CREEK	SILVER CR- HEADWATERS	1448.	5860.
LOS COCHES CREEK	BERRYESSA- HEADWATERS	1307.	5287.
COYOTE CREEK	METCALF RD-ANDERSON DAM	2866.	11596.
CALERA CREEK	BERRYESSA-HEADWATERS STAGE 1	1000.	4045.
CALERA CREEK	BERRYESSA-HEADWATERS STAGE 2	984.	3980.
FLINT CREEK	SILVER CR-HEADWATERS STAGE 1	699.	2827.
FLINT CREEK	SILVER CR-HEADWATERS STAGE 2	699.	2827.
FLINT CREEK	SILVER CR-HEADWATERS STAGE 3	702.	2841.
THOMPSON CREEK	ABORN -EVERGREEN CANAL	913.	3694.
BERRYESSA CREEK	MORRILL -HEADWATERS	632.	2558.
EAST PENITENCIA CR	LOWER PENITENCIA- TRIMBLE	207.	839.

```
                    PROJECTS WHICH REMAIN TO BE CONSTRUCTED AFTER  1989-90

              CREEK                             REACH/STAGE                        COST(1000$)

   THOMPSON CREEK                      EVERGREEN CANAL-HEADWATERS                815.      3298.
   YERBA BUENA CREEK                   THOMPSON-HEADWATERS                       254.      1028.

                                 TOTAL COST OF ALL PROJECTS IN ZONE             69915.   282846.
```

EAST ZONE

CASH FLOW SUMMARY

	SCHEDULE YEAR									
	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90
BEGINNING CASH BALANCE	853.	720.	992.	1081.	1179.	1284.	1400.	1526.	1663.	1812.
AB549 FUNDS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LOCAL TAX REVENUES	1062.	1240.	1364.	1500.	1650.	1815.	1997.	2197.	2416.	2658.
INTEREST INCOME	176.	72.	99.	108.	118.	128.	140.	153.	166.	181.
OTHER MISC REVENUES-MINOR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTAL REVENUES	2091.	2032.	2455.	2690.	2946.	3228.	3537.	3875.	4245.	4652.
ADMINISTRATION COSTS	210.	240.	264.	290.	319.	351.	387.	425.	467.	514.
PLANNING	163.	0.	230.	253.	278.	306.	336.	370.	407.	447.
CONSTRUCTION	666.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NORMAL MAINTENANCE	332.	800.	880.	968.	1065.	1171.	1288.	1417.	1559.	1715.
MAJOR FACILITY APPROPRIATION	520.	687.	756.	831.	914.	1005.	1106.	1217.	1338.	1539.
CONTINGENCY APPROPRIATION	100.	105.	110.	116.	122.	128.	134.	141.	148.	155.
SUB TOTAL	1991.	1832.	2240.	2458.	2698.	2961.	3251.	3570.	3919.	4370.
CONSTRUCTION UNENCUMBERED	100.	200.	216.	232.	249.	267.	286.	306.	326.	281.
TOTAL	2091.	2032.	2455.	2690.	2946.	3228.	3537.	3875.	4245.	4652.

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                                          TEN YEAR PLANNING SCHEDULE                                                  12/29/80
                                               EAST ZONE  (AB549  $12 UNIFORM RATE)
                                                        WITHOUT  COE 205 PROJECT

     PLANNING = 10 PROJECTS/YEAR      DESIGN = 10 PROJECTS/YEAR        INFLATION RATE = .1500 /YEAR      INVESTMENT RATE = .1000/YEAR

                                   PROJECT  PRVOUS                               SCHEDULE  YEAR                                  TOTAL
         COST FUNCTION             PRIORTY  SPENT                   (ALL COSTS ARE IN 1000S OF DOLLARS)                          PROJCT
        (PROJECT=REACH)            NUMBER   MONIES    80=81  81=82  82=83  83=84  84=85  85=86  86=87  87=88  88=89  89=90       COST

    INCOME   INCOME   INCOME

     AB549 FUNDS                                         0.  2080.  2288.  2517.  2768.  3045.  3350.  3685.  4053.  4459.

    LOCAL TAX REVENUES                                1062.  1240.  1364.  1500.  1650.  1815.  1997.  2197.  2416.  2658.

    OTHER MISC REVENUES=MINOR                            0.     0.     0.     0.     0.     0.     0.     0.     0.     0.

     TOTAL STATE=LOCAL=MISC,REVENUES                  1062.  3320.  3652.  4017.  4418.  4860.  5347.  5882.  6469.  7117.

     PRIOR RESERVES PLUS INTEREST                      176.   715.   904.   952.  1042.  1139.  1246.  1364.  1493.  1635.

     SOME FUNDS CARRIED OVER
     FROM PRIOR YEARS                                  853.    57.   679.   147.   756.     0.   695.   533.    =0.  1614.

    EXPENSES=EXPENSES=EXPENSES

    ADMINISTRATION COSTS
                                      0        0.      210.   240.   264.   290.   319.   351.   387.   425.   467.   514.      3467.

    NORMAL MAINTENANCE
                                      0        0.      332.   800.   880.   968.  1065.  1171.  1288.  1417.  1559.  1715.     11195.

    MAJOR FACILITY APPROPRIATION
                                      0        0.      550.   717.   756.   831.   914.  1005.  1106.  1217.  1338.  1539.      9973.

    CONTINGENCY APPROPRIATION
                                      0        0.      100.   105.   110.   116.   122.   128.   134.   141.   148.   155.      1258.

    ORDINANCE CONSTRUCTION
                                      0        0.       43.     0.     0.     0.     0.     0.     0.     0.     0.     0.        43.

    BERRYESSA CREEK
      CROPLEY=FWY680                  0        0.      301.     0.     0.     0.     0.     0.     0.     0.     0.     0.       301.

    LOWER SILVER CR=SUNSET BRIDGE
      CO=OP WITH CITY OF SJ           0        0.      163.     0.     0.     0.     0.     0.     0.     0.     0.     0.       163.
```

			SCHEDULE YEAR									
			80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	
THOMPSON CR NORWOOD CR-ABORN	0	0.	39.	0.	0.	0.	0.	0.	0.	0.	0.	0.	39.
THOMPSON CR QUIMBY-TULLY	0	0.	69.	0.	0.	0.	0.	0.	0.	0.	0.	0.	69.
ENGRG SERVICES - CONST	0	0.	51.	0.	0.	0.	0.	0.	0.	0.	0.	0.	51.
PROJECTS IN PLANNING													
SF BAY STUDY	0	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
WATERWAYS PLAN STUDY	0	0.	14.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14.
WPS-PHASE II EAST ZONE	0	0.	96.	0.	0.	0.	0.	0.	0.	0.	0.	0.	96.
COYOTE CR INTERIM/REMEDIAL STUDY	0	0.	34.	0.	0.	0.	0.	0.	0.	0.	0.	0.	34.
LOWER SILVER-SCS	0	0.	8.	0.	0.	0.	0.	0.	0.	0.	0.	0.	8.
ENGRG SERVICES - PLANNING	0	0.	9.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.
UPPER PENITENCIA CREEK	4	0.	0.	60.	60.	0.	0.	0.	0.	0.	0.	0.	120.
FUTURE PLANNING	0	0.	0.	0.	230.	253.	278.	306.	336.	370.	407.	447.	2628.
NEW PROJECTS--D&C													
LOWER SILVER CREEK LOCAL SHARE OF SCS PROJ	0	0.	0.	0.	545.	627.	721.	0.	0.	0.	0.	0.	1893.
LOWER PENITENCIA COYOTE-BERRYESSA	0	0.	0.	878.	948.	0.	0.	0.	0.	0.	0.	0.	1826.
LOWER PENITENCIA BERRYESSA-SPENCE AVE	0	0.	0.	391.	0.	0.	0.	0.	0.	0.	0.	0.	391.

SCHEDULE YEAR

				80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	
BERRYESSA CREEK CALAVERAS-MONTAGUE		0	0.	0.	283.	1309.	0.	0.	0.	0.	0.	0.	0.	1592.
BERRYESSA CREEK MONTAGUE-MORRILL		0	0.	0.	0.	0.	546.	0.	0.	0.	0.	0.	0.	546.
UPPER PENITENCIA CREEK COYOTE CR-CAPITOL AVE	STAGE 1	0	0.	0.	0.	0.	799.	958.	0.	0.	0.	0.	0.	1757.
UPPER PENITENCIA CREEK COYOTE CR-CAPITOL AVE	STAGE 2	0	0.	0.	0.	0.	0.	919.	1102.	0.	0.	0.	0.	2021.
UPPER PENITENCIA CREEK COYOTE CR-CAPITOL AVE	STAGE 3	0	0.	0.	0.	0.	0.	919.	1102.	0.	0.	0.	0.	2021.
UPPER PENITENCIA CAPITOL AVE-DOREL DR	STAGE 1	0	0.	0.	0.	0.	0.	0.	0.	1776.	1920.	0.	0.	3696.
UPPER PENITENCIA CAPITOL AVE-DOREL DR	STAGE 2	0	0.	0.	0.	0.	0.	0.	0.	1776.	1920.	0.	0.	3696.
UPPER PENITENCIA CAPITOL AVE-DOREL DR	STAGE 3	0	0.	0.	0.	0.	0.	0.	0.	0.	0.	425.	5996.	6421.
FUNDS WHICH ARE SET ASIDE FOR SPECIFIC FUTURE PROJECTS				52.	617.	134.	687.	0.	632.	484.	-0.	1468.	-0.	
BALANCE				19.	0.	0.	0.	0.	203.	0.	370.	2150.	0.	

PROJECTS WHICH REMAIN TO BE CONSTRUCTED AFTER 1989-90

CREEK		REACH/STAGE	COST(1000$) 80-81	COST(1000$) 90-91
COYOTE CREEK	STAGE 1	INBOARD-MONTAGUE	3540.	14321.
COYOTE CREEK	STAGE 2	INBOARD-MONTAGUE	2423.	9801.
COYOTE CREEK	STAGE 3	INBOARD-MONTAGUE	2451.	9917.
COYOTE CREEK	STAGE 4	INBOARD-MONTAGUE	2303.	9315.
COYOTE CREEK		MONTAGUE-BAYSHORE FWY	4706.	19038.
COYOTE CREEK		BAYSHORE FWY-FWY 680	3625.	14665.
COYOTE CREEK		FWY 280-HWY 101	2339.	9462.
COYOTE CREEK		HWY 101-METCALF RD	1851.	7490.
QUIMBY CREEK		THOMPSON - HEADWATERS STAGE 1	1916.	7750.
QUIMBY CREEK		THOMPSON - HEADWATERS STAGE 2	793.	3209.
FOWLER CREEK		THOMPSON - HEADWATERS STAGE 1	1396.	5649.
FOWLER CREEK		THOMPSON - HEADWATERS STAGE 2	723.	2924.
FOWLER CREEK		THOMPSON - HEADWATERS STAGE 3	571.	2310.
RUBY CREEK		SILVER CR -RUBY AVE STAGE 1	801.	3240.
RUBY CREEK		SILVER CR -RUBY AVE STAGE 2	803.	3246.
FISHER CREEK		COYOTE CR- BAILEY STAGE 1	1214.	4911.
FISHER CREEK		COYOTE CR- BAILEY STAGE 2	1214.	4911.
FISHER CREEK		COYOTE CR- BAILEY STAGE 3	1214.	4911.
FISHER CREEK		COYOTE CR- BAILEY STAGE 4	1216.	4920.
FISHER CREEK		BAILEY-TILTON AVE STAGE 1	1671.	6759.
FISHER CREEK		BAILEY-TILTON AVE STAGE 2	1671.	6759.
FISHER CREEK		BAILEY-TILTON AVE STAGE 3	1671.	6759.
FISHER CREEK		BAILEY-TILTON AVE STAGE 4	1671.	6759.
FISHER CREEK		BAILEY-TILTON AVE STAGE 5	1677.	6786.
EVERGREEN CREEK		THOMPSON -HEADWATERS	1235.	4996.
SOUTH BABB CREEK		SILVER CR- HEADWATERS	1448.	5860.
LOS COCHES CREEK		BERRYESSA- HEADWATERS	1307.	5287.
COYOTE CREEK		METCALF RD-ANDERSON DAM	2866.	11596.
CALERA CREEK		BERRYESSA-HEADWATERS STAGE 1	1000.	4045.
CALERA CREEK		BERRYESSA-HEADWATERS STAGE 2	984.	3980.
FLINT CREEK		SILVER CR-HEADWATERS STAGE 1	699.	2827.
FLINT CREEK		SILVER CR-HEADWATERS STAGE 2	699.	2627.
FLINT CREEK		SILVER CR-HEADWATERS STAGE 3	702.	2841.
THOMPSON CREEK		ABORN -EVERGREEN CANAL	913.	3694.
BERRYESSA CREEK		MORRILL -HEADWATERS	632.	2558.
EAST PENITENCIA CR		LOWER PENITENCIA- TRIMBLE	207.	839.
THOMPSON CREEK		EVERGREEN CANAL-HEADWATERS	815.	3298.
YERBA BUENA CREEK		THOMPSON-HEADWATERS	254.	1028.
		TOTAL COST OF ALL PROJECTS IN ZONE	57221.	231490.

12/29/80

EAST ZONE (AB549 $12 UNIFORM RATE)

CASH FLOW SUMMARY

	SCHEDULE YEAR									
	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90
BEGINNING CASH BALANCE	853.	720.	1460.	1022.	1659.	1063.	1997.	1980.	2008.	5820.
AB549 FUNDS	0.	2080.	2288.	2517.	2768.	3045.	3350.	3685.	4053.	4459.
LOCAL TAX REVENUES	1062.	1240.	1364.	1500.	1650.	1815.	1997.	2197.	2416.	2658.
INTEREST INCOME	176.	72.	146.	102.	166.	106.	200.	198.	201.	582.
OTHER MISC REVENUES-MINOR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTAL REVENUES	2091.	4112.	5258.	5141.	6242.	6029.	7544.	8060.	8678.	13519.
ADMINISTRATION COSTS	210.	240.	264.	290.	319.	351.	387.	425.	467.	514.
PLANNING	163.	60.	290.	253.	278.	306.	336.	370.	407.	447.
CONSTRUCTION	666.	1553.	2802.	1972.	3517.	2204.	3553.	3840.	425.	5996.
NORMAL MAINTENANCE	332.	800.	880.	968.	1065.	1171.	1288.	1417.	1559.	1715.
MAJOR FACILITY APPROPRIATION	550.	717.	756.	831.	914.	1005.	1106.	1217.	1338.	1539.
CONTINGENCY APPROPRIATION	100.	105.	110.	116.	122.	128.	134.	141.	148.	155.
SUB TOTAL	2021.	3475.	5101.	4430.	6215.	5165.	6804.	7409.	4344.	10366.
CONSTRUCTION UNENCUMBERED	70.	638.	156.	712.	27.	864.	740.	651.	4334.	3153.
TOTAL	2091.	4112.	5258.	5141.	6242.	6029.	7544.	8060.	8678.	13519.

TEN YEAR PLANNING SCHEDULE
EAST ZONE (AB549 $12 UNIFORM RATE)
WITH COE 205 PROJECT

12/29/80

PLANNING - 10 PROJECTS/YEAR DESIGN - 10 PROJECTS/YEAR INFLATION RATE = .1500 /YEAR INVESTMENT RATE = .1000/YEAR

COST FUNCTION (PROJECT-REACH)	PROJECT PRIORTY NUMBER	PRVOUS SPENT MONIES	SCHEDULE YEAR (ALL COSTS ARE IN 1000S OF DOLLARS) 80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	TOTAL PROJCT COST
INCOME INCOME INCOME													
AB549 FUNDS			0.	2080.	2288.	2517.	2768.	3045.	3350.	3685.	4053.	4459.	
LOCAL TAX REVENUES			1062.	1240.	1364.	1500.	1650.	1815.	1997.	2197.	2416.	2658.	
OTHER MISC REVENUES-MINOR			0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	
TOTAL STATE-LOCAL-MISC.REVENUES			1062.	3320.	3652.	4017.	4418.	4860.	5347.	5882.	6469.	7117.	
PRIOR RESERVES PLUS INTEREST			176.	715.	904.	952.	1042.	1139.	1246.	1364.	1493.	1635.	
SOME FUNDS CARRIED OVER FROM PRIOR YEARS			853.	46.	979.	1917.	1143.	340.	318.	0.	1171.	0.	
EXPENSES-EXPENSES-EXPENSES													
ADMINISTRATION COSTS	0	0.	210.	240.	264.	290.	319.	351.	387.	425.	467.	514.	3467.
NORMAL MAINTENANCE	0	0.	332.	800.	880.	968.	1065.	1171.	1288.	1417.	1559.	1715.	11195.
MAJOR FACILITY APPROPRIATION	0	0.	550.	717.	756.	831.	914.	1005.	1106.	1217.	1338.	1539.	9973.
CONTINGENCY APPROPRIATION	0	0.	100.	105.	110.	116.	122.	128.	134.	141.	148.	155.	1258.
ORDINANCE CONSTRUCTION	0	0.	43.	0.	0.	0.	0.	0.	0.	0.	0.	0.	43.
BERRYESSA CREEK CROPLEY-FWY680	0	0.	301.	0.	0.	0.	0.	0.	0.	0.	0.	0.	301.
LOWER SILVER CR-SUNSET BRIDGE CO-OP WITH CITY OF SJ	0	0.	163.	0.	0.	0.	0.	0.	0.	0.	0.	0.	163.

			SCHEDULE YEAR 80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90	
THOMPSON CR NORWOOD CR-ABORN	0	0.	39.	0.	0.	0.	0.	0.	0.	0.	0.	0.	39.
THOMPSON CR QUIMBY-TULLY	0	0.	69.	0.	0.	0.	0.	0.	0.	0.	0.	0.	69.
ENGRG SERVICES - CONST	0	0.	51.	0.	0.	0.	0.	0.	0.	0.	0.	0.	51.
PROJECTS IN PLANNING													
SF BAY STUDY	0	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
WATERWAYS PLAN STUDY	0	0.	14.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14.
WPS-PHASE II EAST ZONE	0	0.	96.	0.	0.	0.	0.	0.	0.	0.	0.	0.	96.
COYOTE CR INTERIM/REMEDIAL STUDY	0	0.	34.	0.	0.	0.	0.	0.	0.	0.	0.	0.	34.
LOWER SILVER-SCS	0	0.	8.	0.	0.	0.	0.	0.	0.	0.	0.	0.	8.
ENGRG SERVICES - PLANNING	0	0.	9.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.
UPPER PENITENCIA CREEK	4	0.	0.	60.	60.	0.	0.	0.	0.	0.	0.	0.	120.
FUTURE PLANNING	0	0.	0.	0.	230.	253.	278.	306.	336.	370.	407.	447.	2628.
NEW PROJECTS--DRC													
LOWER SILVER CREEK LOCAL SHARE OF SCS PROJ	0	0.	0.	0.	545.	627.	721.	0.	0.	0.	0.	0.	1893.
LOWER PENITENCIA COYOTE-BERRYESSA	0	0.	0.	878.	948.	0.	0.	0.	0.	0.	0.	0.	1826.
LOWER PENITENCIA BERRYESSA-SPENCE AVE	0	0.	0.	391.	0.	0.	0.	0.	0.	0.	0.	0.	391.

```
                                                                                  SCHEDULE  YEAR
                                                                   80=81   81=82   82=83   83=84   84=85   85=86   66=87   87=88   88=89   89=90

BERRYESSA CREEK
 LOCAL SHARE OF COE PROJ        0         0.         0.      0.      0.    365.      0.      0.      0.      0.      0.      0.     365.

UPPER PENITENCIA CREEK
COYOTE CR=CAPITOL AVE  STAGE 1  0         0.         0.      0.      0.    799.    958.      0.      0.      0.      0.      0.    1757.

UPPER PENITENCIA CREEK
COYOTE CR=CAPITOL AVE  STAGE 2  0         0.         0.      0.      0.    799.    958.      0.      0.      0.      0.      0.    1757.

UPPER PENITENCIA CREEK
COYOTE CR=CAPITOL AVE  STAGE 3  0         0.         0.      0.      0.    799.    958.      0.      0.      0.      0.      0.    1757.

UPPER PENITENCIA
CAPITOL AVE=DOREL DR   STAGE 1  0         0.         0.      0.      0.      0.      0.   1545.   1669.      0.      0.      0.    3214.

UPPER PENITENCIA
CAPITOL AVE=DOREL DR   STAGE 2  0         0.         0.      0.      0.      0.      0.   1545.   1669.      0.      0.      0.    3214.

UPPER PENITENCIA
CAPITOL AVE=DOREL DR   STAGE 3  0         0.         0.      0.      0.      0.      0.      0.      0.    370.   5214.      0.    5583.

 FUNDS WHICH ARE SET ASIDE
 FOR SPECIFIC FUTURE PROJECTS                             42.    890.   1743.   1039.    309.    289.      0.   1064.      0.      0.

         BALANCE                                          28.      0.      0.      0.      0.      0.    322.   2243.      0.   4381.
```

PROJECTS WHICH REMAIN TO BE CONSTRUCTED AFTER 1989-90

CREEK		REACH/STAGE	COST(1000$) 80-81	COST(1000$) 90-91
COYOTE CREEK	STAGE 1	INBOARD-MONTAGUE	3540.	14321.
COYOTE CREEK	STAGE 2	INBOARD-MONTAGUE	2423.	9801.
COYOTE CREEK	STAGE 3	INBOARD-MONTAGUE	2451.	9917.
COYOTE CREEK	STAGE 4	INBOARD-MONTAGUE	2303.	9315.
COYOTE CREEK		MONTAGUE-BAYSHORE FWY	4706.	19038.
COYOTE CREEK		BAYSHORE FWY-FWY 680	3625.	14665.
COYOTE CREEK		FWY 280-HWY 101	2339.	9462.
COYOTE CREEK		HWY 101-METCALF RD	1851.	7490.
QUIMBY CREEK		THOMPSON - HEADWATERS STAGE 1	1916.	7750.
QUIMBY CREEK		THOMPSON - HEADWATERS STAGE 2	793.	3209.
FOWLER CREEK		THOMPSON - HEADWATERS STAGE 1	1396.	5649.
FOWLER CREEK		THOMPSON - HEADWATERS STAGE 2	723.	2924.
FOWLER CREEK		THOMPSON - HEADWATERS STAGE 3	571.	2310.
RUBY CREEK		SILVER CR -RUBY AVE STAGE 1	801.	3240.
RUBY CREEK		SILVER CR -RUBY AVE STAGE 2	803.	3248.
FISHER CREEK		COYOTE CR- BAILEY STAGE 1	1214.	4911.
FISHER CREEK		COYOTE CR- BAILEY STAGE 2	1214.	4911.
FISHER CREEK		COYOTE CR- BAILEY STAGE 3	1214.	4911.
FISHER CREEK		COYOTE CR- BAILEY STAGE 4	1216.	4920.
FISHER CREEK		BAILEY-TILTON AVE STAGE 1	1671.	6759.
FISHER CREEK		BAILEY-TILTON AVE STAGE 2	1671.	6759.
FISHER CREEK		BAILEY-TILTON AVE STAGE 3	1671.	6759.
FISHER CREEK		BAILEY-TILTON AVE STAGE 4	1671.	6759.
FISHER CREEK		BAILEY-TILTON AVE STAGE 5	1677.	6786.
EVERGREEN CREEK		THOMPSON -HEADWATERS	1235.	4996.
SOUTH BABB CREEK		SILVER CR- HEADWATERS	1448.	5860.
LOS COCHES CREEK		BERRYESSA- HEADWATERS	1307.	5287.
COYOTE CREEK		METCALF RD-ANDERSON DAM	2866.	11596.
CALERA CREEK		BERRYESSA-HEADWATERS STAGE 1	1000.	4045.
CALERA CREEK		BERRYESSA-HEADWATERS STAGE 2	984.	3980.
FLINT CREEK		SILVER CR-HEADWATERS STAGE 1	699.	2827.
FLINT CREEK		SILVER CR-HEADWATERS STAGE 2	699.	2827.
FLINT CREEK		SILVER CR-HEADWATERS STAGE 3	702.	2841.
THOMPSON CREEK		ABORN -EVERGREEN CANAL.	913.	3694.
BERRYESSA CREEK		MURRILL -HEADWATERS	632.	2558.
EAST PENITENCIA CR		LOWER PENITENCIA- TRIMBLE	207.	839.
THOMPSON CREEK		EVERGREEN CANAL-HEADWATERS	815.	3298.
YERBA BUENA CREEK		THOMPSON-HEADWATERS	254.	1028.
		TOTAL COST OF ALL PROJECTS IN ZONE	57221.	231490.

EAST ZONE (AB549 $12 UNIFORM RATE)

CASH FLOW SUMMARY

	SCHEDULE YEAR									
	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90
BEGINNING CASH BALANCE	853.	720.	1743.	2643.	2023.	1386.	1467.	1611.	5072.	4402.
AB549 FUNDS	0.	2080.	2288.	2517.	2768.	3045.	3350.	3685.	4053.	4459.
LOCAL TAX REVENUES	1062.	1240.	1364.	1500.	1650.	1815.	1997.	2197.	2416.	2658.
INTEREST INCOME	176.	72.	174.	264.	202.	139.	147.	161.	507.	440.
OTHER MISC REVENUES-MINOR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TOTAL REVENUES	2091.	4112.	5569.	6924.	6644.	6385.	6961.	7654.	12049.	11959.
ADMINISTRATION COSTS	210.	240.	264.	290.	319.	351.	387.	425.	467.	514.
PLANNING	163.	60.	290.	253.	278.	306.	336.	370.	407.	447.
CONSTRUCTION	666.	1269.	1493.	3390.	3595.	3089.	3339.	370.	5214.	0.
NORMAL MAINTENANCE	332.	800.	880.	968.	1065.	1171.	1288.	1417.	1559.	1715.
MAJOR FACILITY APPROPRIATION	550.	717.	756.	831.	914.	1005.	1106.	1217.	1338.	1539.
CONTINGENCY APPROPRIATION	100.	105.	110.	116.	122.	126.	134.	141.	148.	155.
SUB TOTAL	2021.	3191.	3792.	5848.	6293.	6050.	6590.	3939.	9133.	4370.
CONSTRUCTION UNENCUMBERED	70.	921.	1777.	1076.	350.	334.	371.	3715.	2916.	7589.
TOTAL	2091.	4112.	5569.	6924.	6644.	6385.	6961.	7654.	12049.	11959.

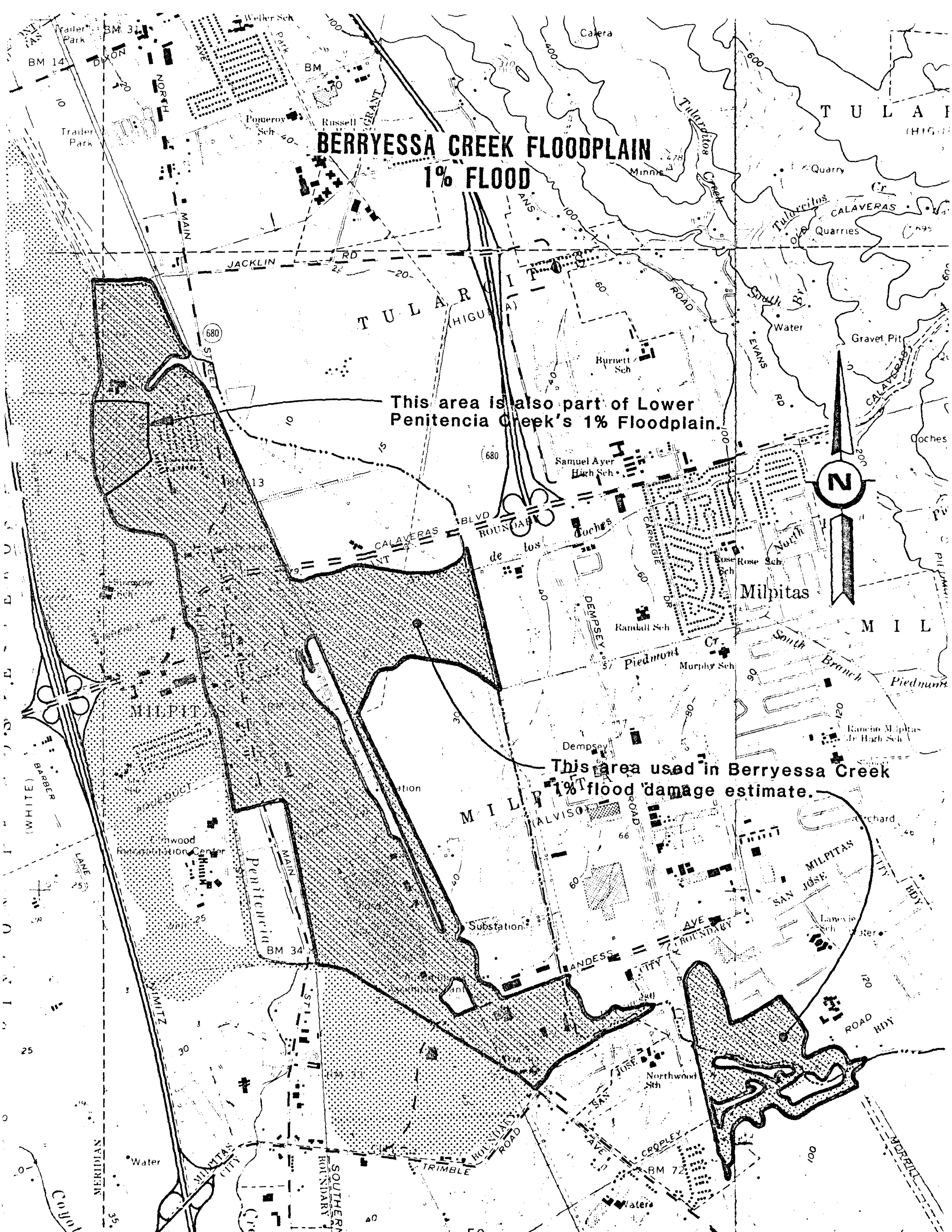
APPENDIX F

BERRYESSA CREEK

Flood Map

Flood Damage Summary

Flood Insurance Summary



BERRYESSA CREEK FLOODPLAIN 1% FLOOD

This area is also part of Lower Penitencia Creek's 1% Floodplain.

This area used in Berryessa Creek 1% flood damage estimate.

EAST ZONE   BERRYESSA CREEK

SUMMARY

FLOOD DAMAGES

LAND USE	AREA FLOODED ACRES	NUMBER OF BLDGS	DIRECT STRUCT DAMAGE	DIRECT CONTENT DAMAGE	INDIRECT DAMAGES	TOTAL FLOOD DAMAGES
SF RESIDENT	192.	881.	14067.	4220.1	2743.	21030.
APT RESID	6.	65.	102.	30.6	20.	152.
MOBILE HOME	0.	0.	0.	0.0	0.	0.
COMMERCIAL	11.	1.	146.	292.6	154.	593.
INDUSTRIAL	275.	98.	380.	949.1	598.	1927.
SCHLS,PUBLC	7.	1.	39.	78.4	40.	158.
OPEN IMPRVD	97.	0.	0.	0.0	0.	21.
AGRICULTURE	188.	0.	0.	0.0	0.	12.
VACANT LAND	35.	0.	0.	0.0	0.	0.
TOTAL	811.	1046.	14734.	5570.8	3554.	23893.

EAST ZONE BERRYESSA CREEK

SUMMARY
FLOOD INSURANCE

LAND USE	NUMBER OF BLDGS	REQUIRED STRUCTURE INSURANCE (1000$)	OPTIONAL ADDITION STRUCTURE INSURANCE	INSURANCE ON CONTENTS (1000$)	TOTAL ANNUAL COST (1000$)	PRESENT WORTH OF ANNUAL (1000$)
SF RESIDENT	881.	169.7	102.9	0.6	273.2	2575.1
APT RESID	65.	12.7	0.0	0.1	12.9	121.3
MOBILE HOME	0.	0.0	0.0	0.0	0.0	0.0
COMMERCIAL	1.	0.9	0.3	3.0	4.1	38.7
INDUSTRIAL	98.	54.2	0.0	16.7	70.8	667.7
SCHLS,PUBLC	1.	0.9	0.0	1.9	2.8	26.0
OPEN IMPRVD	0.	0.0	0.0	0.0	0.0	0.0
AGRICULTURE	0.	0.0	0.0	0.0	0.0	0.0
VACANT LAND	0.	0.0	0.0	0.0	0.0	0.0
TOTAL	1046.	238.4	103.1	22.2	363.7	3428.9

APPENDIX G

PROJECT COSTS

BERRYESSA CREEK PROJECT COSTS

Calaveras Road - Montague Expressway

The proposed project calls for enlarging of the existing earth channel, and construction of a confluence structure at Piedmont and Los Coches Creeks, four drop structures, and a railroad trestle 450 feet downstream of Montague Expressway.

Project Cost (June 1980)

Construction		$805,000	(ENR=3905)
Landscaping (6%)		48,000	
Engineering Design (10%)		81,000	
Contingencies, Inspection (25%)		201,000	
Total Construction Cost		1,135,000	
Right of Way 1.68 Ac @ $80,000/Ac.	=	134,400	
Contingencies (15%)		20,200	
Adminstration (8%)		10,800	
Total Right of Way Cost		165,400	
Total Project Cost			$1,300,400

Project will be accomplished in two parts:

1st year: $165,400 right of way, $81,000 engineering design

2nd year: $1,054,000 + 8% inflation = $1,138,300 construction

Montague Expressway-Morrill Avenue

The proposed project calls for the construction of earth channel, concrete-lined channel, and a drop structure.

Project Cost (June 1980)

Construction		$209,800	(ENR=3905)
Landscaping (6%)		12,600	
Engineering Design (10%)		21,000	
Contingencies, Inspection (25%)		52,300	
Total Construction Cost		295,700	
Right of Way 0.64 Ac. @ $80,000/Ac.	=	51,200	
Contingencies (15%)		7,700	
Adminstration (8%)		4,100	
Total Right of Way Cost		63,000	
Total Project Cost			$358,700

LOWER PENITENCIA CREEK PROJECT COSTS

Coyote Creek - Berryessa Creek

The project proposed in 1973 consists of an unlined trapezoidal channel with a concrete lined section through Nimitz Freeway (Highway 17). The proposed right of way through this reach is 196 feet-wide; existing right of way is 120 feet-wide.

June 1980	Construction	541,500	(ENR=3905)
	Landscaping (6%)	32,500	
	Engineering Design (10%)	54,200	
	Contingencies, Inspection (25%)	135,400	
		$763,600	
	Right of Way 8.37 ac @ $80,000/ Ac. =	670,000	
	Contingencies (15%)	100,500	
	Adminstration (8%)	53,600	
		$824,100	
	Total Cost:	$1,587,700	

LOWER PENITENCIA CREEK PROJECT COSTS

Berryessa Creek - Spence Avenue

From the confluence with Berryessa Creek to Redwood Avenue (Station 48+00 to 67+50) the existing levees must be raised approximately three feet. The proposed right of way through this reach is 129 feet-wide, all of which has been acquired except for a 16-foot by 700-foot strip owned by the City of Milpitas adjacent to a storm drainage pond.

Through the Curtner Estate subdivisions to Spence Avenue (Station 67+50 to 111+50) the existing levees are inadequate with no right of way available to raise them. In order to provide the required capacity low concrete floodwalls two to three feet in height will be constructed.

June 1980	Construction	222,800	(ENR=3905)
	Landscaping (6%)	13,400	
	Engineering Design (10%)	22,300	
	Contingencies, Inspection (25%)	55,700	
		$314,200	
	Right of Way 0.26 Ac @ $80,000/ Ac. =	20,600	
	Contingencies (15%)	3,100	
	Administration (8%)	1,600	
		$25,300	
	Total Cost:	$339,500	

UPPER PENITENCIA PROJECT COSTS

Coyote Creek - Capitol Avenue (Station 0+00 to 95+75)

The project proposed in 1973 consists of the following improvements:

Location	Station	Improvements
Coyote Creek to U/S of King Road	0+00 - 25+50	New trapezoidal earth channel; two drop structures, new bridge for the WPRR crossing; siphoning the central pipeline; new bridge crossing at King Road.
U/S of King Road to D/S of Fwy. 680	25+50 - 79+00	Typical section is floodplain with levees approximately six-feet high. Natural channel is rerouted at the existing Mabury Road. A small pipe will divert low flows to percolation ponds within the Education and Overfelt Parks. A portion of a greenhouse will need to be relocated.
D/S of Fwy. 680 to Capitol Avenue	79+00 - 95+75	Trapezoidal earth channel with levees, one drop structure, one stilling basin energy dissipator, protective lining for PG&E gas lines.

June 1980	Construction	1,335,000	(ENR=3905)
	Landscaping (6%)	80,100	
	Engineering Design (10%)	133,500	
	Contingencies, Inspection (25%)	333,800	
		$1,882,400	
	Right of Way	1,173,000	
	Contingencies (15%)	176,000	
	Administration (8%)	94,000	
		$1,443,000	
	Total Cost:	$3,326,000	

The project is implemented in three equal stages. All the stages may be done in the same year if staff and finances permit.

Stage 1. 481,000 Right of Way, 44,500 Design,
583,000 + 8% Inflation = 630,000 Construction

Stage 2. 481,000 Right of Way, 44,500 Design
583,000 + 8% Inflation = 630,000 Construction

Stage 3. 481,000 Right of Way, 44,500 Design
583,000 + 8% Inflation = 630,000 Constriction

UPPER PENITENCIA CREEK PROJECT COSTS

Capitol Avenue - Dorel Drive (Station 95+75 to 198+00)

This project proposed in 1973 includes replacement of the Capitol Avenue bridge, one drop structure, construction of six-foot levees and a six-foot floodwall from Capitol Avenue to Penitencia Creek Road; relocation of 13 homes, and building of levees 3.5 to 5.0 feet high to Piedmont Road; the building of 1,400 feet of trapezoidal earth channel with drop structure through the percolation ponds adjacent to existing channel; construction of a stilling basin energy dissipator downstream of Noble Avenue and 800 feet of rectangular concrete channel upstream of Noble Avenue.

The project also includes a rock-lined channel 800 feet upstream of Noble Avenue to 600 feet downstream of Dorel Drive, an additional 12-foot by 10-foot RCB under Dorel Drive, and a 15-foot-wide bridge for private access upstream of Dorel Drive.

June 1980	Construction	1,385,000	(ENR=3905)
	Landscaping (6%)	83,100	
	Engineering Design (10%)	139,000	
	Contingencies, Inspection (25%)	346,300	
		1,953,400	
	Right of Way	2,497,000	
	Contingencies (15%)	375,000	
	Administration (8%)	200,000	
		3,072,000	
	Total Cost:	$5,025,400	

Project will be implemented in several stages including two two-year stages for right of way acquisition. Design and construction will be part of Stage 3.

Stage 1. $768,000 right of way, $768,000 + 8% inflation = $830,000

Stage 2. $768,000 right of way, $768,000 + 8% inflation = $830,000

Stage 3. $139,000 design, $1,814,400 + 8% inflation = $1,960,000 Construction